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2022 Country Report - Germany

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Recommendation for a COUNCIL RECOMMENDATION

on the 2022 National Reform Programme of Germany and delivering a Council opinion on the 2022 Stability Programme of Germany

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European Commission

Germany

2022 Country Report



ECONOMIC AND EMPLOYMENT SNAPSHOT

Germany's strong economic performance faces challenges

Germany's economy was losing momentum in the run-up to the COVID-19 crisis. Its growth, which was above the EU average in the decade following the global financial crisis, halved to just over 1% in 2018-2019. This was the result of a slowdown in global growth and trade, weakening productivity growth and transformations in the car industry. Regional GDP and growth disparities, which have declined since 2001, remain high and reflect a continued east-west divide.

Effective policy support has cushioned the economic impact of the pandemic. Short-time work schemes helped contain job losses and employment recovered to pre-pandemic levels. Support for companies averted insolvencies and income support shielded household incomes. As a result, real GDP declined by 4.6% in 2020, less than in the EU and the euro area. Public investment increased by 6%, cushioning the shortfall in overall investments.

The geopolitical context combined with supply bottlenecks weighs on growth. While exports recovered strongly in 2021, continuing supply shortages of key raw materials and components have delayed the recovery in private equipment investment and halted the expansion of public investment. The re-emergence of pandemic-related restrictions in late 2021 and early 2022 also held back consumer spending. Just as the health situation, industrial and service activity showed tentative signs of improvement in early-2022, disruptions due to Russia's invasion of Ukraine weakened growth and spurred inflation. Nevertheless, after recovering moderately, by 2.9% in 2021, real GDP is expected to continue expanding in 2022 by 1.6% due to significant pent-up investment and consumer demand.

The large and persistent current account surplus reflects among others high savings relative to investment. While the surplus has declined from its 2015 peak of 8.6% of GDP, it continues to remain high in 2021, at 7.4% of GDP, as a significant share of consumption and investment could not materialise amid the COVID-19 pandemic. It is forecast to decline to 6.4% in 2022 because of the increase in commodity prices and trade disruption and to rebound slightly by 2023, remaining above the level indicated by fundamentals. Massive fiscal support helped shore up private sector balance sheets. In 2021, the corporate sector increased its net lending (surplus savings) for a second year in a row. Also households' net lending remained higher than its pre-pandemic level. Germany has increased public investment and plans further increases in the coming decade. The resources so far allocated may nonetheless not cover all large investments needs and may have relatively limited impact on the current account surplus. ([1]).

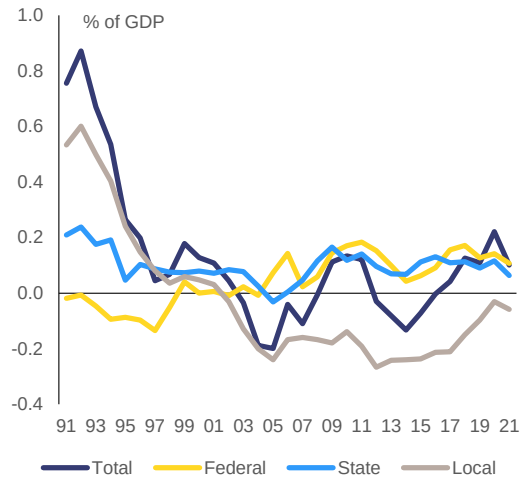
Decarbonisation, digitalisation, education, transport and infrastructure require investment, while implementation barriers affect the business environment and hold back private investment. Estimates of the accumulated public investment needs related to decarbonisation, digitalisation, education, transport and infrastructure vary between 1.3% and 2.1% of GDP per year over the next decade and beyond ([2]). Given the increasing importance of the green and digital transitions at both EU

([1]) See Annex 17.

([2]) Bardt et al., 2020; Agora Energiewende, 2021; Krebs, 2020 and KfW, 2021

and national level, these estimates could even be revised upwards. Investment needs at all government levels are high and are particularly pronounced at the local level to sustain the quality of municipal infrastructure after decades of negative net investment (see Graph 1.1). Current roll-out of electricity networks and very high-capacity digital networks fall short of what is needed for achieving the planned green and digital transformation. Upgrading these networks and the public infrastructure is also crucial for unlocking private investment in these areas. Still, both public and private investment are held back by implementation barriers such as complex and lengthy planning and permitting procedures, and legal, financial and administrative constraints.

Graph 1.1: Net public investment by government subsector



Source: DESTATIS

Policy support, including the short-time work arrangement *Kurzarbeit*, shielded employees, but growth is held back by increasing shortages of labour and skills. By March 2022, employment reached its pre-crisis level. Unemployment, at 3.1% at the beginning of 2022, is among the lowest in the EU, while vacancies have already reached pre-crisis levels. The pandemic has precipitated labour market exits by workers approaching retirement. This, together with the recovery going forward, has been leading to growing shortages of skilled workers in certain sectors ([3]). Wages declined by 0.4% in 2020 and increased by 3.2% in 2021. As the labour market tightens again, wages may grow faster. Wage growth may be particularly strong for low wages given the planned increase of the minimum wage to EUR 12 (+25% compared with end 2021), among the highest in the EU ([4]).

High energy prices and tighter labour markets have had a noticeable impact on inflation. Consumer price inflation soared in the second half of 2021, lifting the annual average rate to 3.2%, from just 0.4% a year before. Rising energy and commodity prices and transportation costs, increased carbon taxes and the reversal of the temporary VAT reduction were significant factors behind the increase in inflation. In April 2022, harmonised index of consumer prices inflation soared at 7.8% and is expected to average 6.5% for the year, driven by the surge in energy prices and rising input costs amid strong demand. Staggered cost pass-through and a boost to service sector wages, due to an increase in the minimum wage in late 2022, are expected to maintain inflation above 3% in 2023.

Reducing inequalities is key to making the economy more inclusive, in line with the European Pillar of Social Rights. Wealth and income inequality and in-work poverty are higher than the EU average (Annex 1). The proportion of the population at risk of poverty or social exclusion is relatively high, notably among children (see Annex 12). Pandemic restrictions on school attendance disproportionately affected disadvantaged families and children, which risks exacerbating socio-economic inequalities. In 2020, energy poverty was higher than the EU average (Annex 6).

([3]) For example manufacturing, construction and information and communication. In the long-term and health care sectors, increases in demand cannot be fully met due to challenging working conditions and unattractive wages. See also Annex 6.

([4]) The minimum wage is increasing in three steps in 2022 (increasing from EUR 9.6 to EUR 9.82 per hour in January 2022, EUR 10.45 in July 2022, EUR 12 in October 2022).

House prices have surged recently and are showing signs of overvaluation. Average house prices have almost doubled since 2010 and rose by 11% in 2021. Commission and European Central Bank models point to an overvaluation of 20-30% in 2021 ([5]). Risks have increased to a level that requires policy action, therefore triggering a recommendation by the European Systemic Risk Board (ESRB) in February 2022. Overall, the increase of house prices and an accompanying increase in rents for new tenants have made housing affordability a challenge in cities and for low-income earners.

Germany performs comparatively well in achieving the UN's Sustainable Development Goals. The country performs above the EU average and made progress on most goals, particularly around 'Peace, justice and strong institutions', 'Decent work and economic growth', and 'Good health and well-being'. However, no progress has been achieved in reducing inequality, which is among the highest in the EU. Despite progress made, major challenges remain with regard to 'Affordable and clean energy' and 'Climate action' (see Annex 1).

The economic impact of Russia's invasion of Ukraine

Commodities and intermediate goods from Russia and Ukraine are important for the German economy. The countries involved are not significant trading partners in size. They do, however, represent a major source of key commodities (energy, metals, minerals, and grain) and supply intermediate products to key industries (automotive, metals, and chemicals). Germany relies heavily on Russian natural gas to bridge the transition away from coal and nuclear power.

Russia's invasion of Ukraine is fuelling inflation. Further price increases and scarcity of energy and other commodities from the affected regions are likely to push production costs up, and further fuel consumer price inflation, which in 2022 is expected to reach 6.5%.

The response to Russia's invasion of Ukraine has triggered additional public spending to cushion the effects of rapidly rising energy and fuel prices. Support measures for households and companies have been put into place, including the advanced abolition of the renewable energy surcharge ([6]), the temporary reduction of the energy tax on fuels, a lump sum energy bonus as well as targeted support for families and low-income earners. Moreover, significant additional public funding has been earmarked for defence spending. By 2 May, Germany has taken in an estimated 480 000 people fleeing Ukraine.

The recovery is expected to be negatively affected by the economic impact of the Russian invasion. The aggravation of supply bottlenecks and increased costs and prices are slowing down economic growth. Nevertheless, GDP growth will continue to be supported by large pent-up investment and consumer demand.

Attaining the ambitious green and digital transition targets requires more investments and policy action

Germany has set ambitious climate targets. It has updated its own 2030

([5]) ECB data warehouse, indicator RESV and Commission Staff Working Document – In-Depth Review for Germany 2022(SWD (2022)629 final). For details on the methodology used by the ECB, see Financial Stability Review, ECB, June 2011 and Financial Stability Review, ECB, November 2015. For the methodology used by the Commission see Philiponnet & Turrini, 2017.

([6]) This surcharge was so far levied on electricity consumption to finance support for renewable electricity. It will be abolished as of 1 July 2022. Support for renewables will be financed from the Energy and Climate Fund.

greenhouse gas emissions reduction target to 65% relative to 1990 and brought forward the goal of climate neutrality to 2045. This will require accelerating the transformation of the economy (see Annex 5). Renewable energy is expected to contribute significantly to the reduction of greenhouse gas emissions. It is also key to reducing Germany's and the EU's high dependence on imported fossil fuels ([7]). The coalition agreement ([8]) sets a target of 80% of renewable electricity by 2030 ([9]). Reaching this target will require further efforts on the expansion of the electricity grid, the deployment of decentralised energy and the reduction of investment bottlenecks. Ensuring a fair transition is key in light of job losses in fossil fuel (coal/lignite) and related industries, such as mining or internal combustion engine car manufacturing (see Annex 6).

Digitalisation remains relatively weak. Germany is addressing some key challenges, but progress on digital networks and digital public services has been slow. Germany continues to lag behind other countries in the coverage of fibre and very high-capacity networks in rural areas (see Annex 8). Creating better framework conditions for digital infrastructure roll-out continues to be a challenge. The integration of digital technologies by companies is only slightly above the EU average. There is also significant potential for improving the digital skills of the population, including teachers, and for improving the availability of ICT specialists.

Sound public finances face challenges and demographic pressure

Public finances were in good shape to absorb the shock of the pandemic but face further challenges related to the impact of Russia's invasion of Ukraine. The country's public finances had seen several years of budget surplus before the outbreak of the pandemic. The debt-to-GDP ratio had declined continuously from its peak of over 82% of GDP in 2010 during the global financial crisis to just below 60% of GDP in 2019. With this comfortable fiscal position, Germany was well positioned to adopt sizeable measures to stabilise the economy and facilitate recovery. The general government deficit reached 4.3% of GDP in 2020 and 3.7% of GDP in 2021. Deficits, combined with the fall in GDP led to an increase in the debt-to-GDP ratio to around 69% in 2021.

The labour tax wedge is one of the highest in the EU. This reduces take-home pay and creates disincentives to increase hours worked for certain groups and aggravates the skills shortage. At the same time, other tax bases, less detrimental to inclusive growth, remain underused. In particular, revenues from environmental taxes are comparatively low (see Annex 18) ([10]). In addition, environmentally harmful subsidies, tax reductions and tax exemptions undermine environmental sustainability targets and counteract decarbonisation, energy efficiency and renewable energy deployment.

Population ageing will constrain economic activity and put pressure on public finances. With the retirement of the baby-boomers generation, demographic change will pick up in the coming years and accelerate even further from the 2030s onwards. This will increase financial pressures on the social security system. Under current rules, this will lead to an increase in the tax-funded federal contribution to the pension system

([7]) Leopoldina, 2022.

([8]) Koalitionsvertrag zwischen SPD, Bündnis 90/Die Grünen und FDP, Koalitionsvertrag 2021 (bundesregierung.de).

([9]) Even more ambitious targets (100% by 2035) are discussed in the context of reducing dependence on fossil fuels.

([10]) Kopernikus-Projekt Ariadne, 2021. Germany has introduced a CO_2 pricing system (national emission trading system) in the transport and heating sectors, that are currently not covered by emissions trading at EU level.

THE RECOVERY AND RESILIENCE PLAN IS UNDERWAY

The German recovery and resilience plan (RRP) includes significant measures to support the twin transition. The recovery and resilience Facility (RRF) contributes EUR 25.6 billion (or 0.74% of GDP) to finance investments and reforms included in the RRP. The plan contributes to all six pillars of the RRF Regulation (see Annex 2). In the area of climate action and energy transition, the plan aims to develop a hydrogen economy, and promote climate-friendly mobility and energy-efficient building renovation. The RRF further supports investment in advanced technologies, in the digital transformation of the automotive industry, and in digitalisation of healthcare services, education and the public administration. The implementation of the RRP is underway in all its major dimensions.

Hydrogen and green transport measures under the plan entered their implementation phase. The plan includes actions to decarbonise the economy, especially industry, with a focus on renewable hydrogen. It provides for Germany's participation in an EU-wide initiative (important project of common European interest – IPCEI) to help the economy make the leap towards renewable hydrogen at all stages of the value chain. The preparation of the IPCEI is ongoing (a call for interest was launched in 2021) and the first hydrogen projects under this EU-wide initiative are expected to have started by 2023. By that time, also a legal framework to help industries become greener is expected to have entered into force. Following a call for ideas for flagship research and innovation projects focusing on hydrogen, three large-scale projects with more than 240 partners started in April 2021, exploring the serial production of water-electrolysers, the production of hydrogen directly at sea based on offshore electricity and the development of transport technologies for hydrogen. The transport sector is also expected to become greener thanks to support for electric cars, clean buses and improved rail connections. . Funding programmes for the acquisition of electric vehicles, for the construction of charging stations, and for the acquisition of green buses already started, allowing projects participants to apply for funding. The registration tax exemption for electric vehicles has been also prolonged to ten years to incentivise further the uptake of electric vehicles. In addition, applications for support started to flow in under the programme for

Box 2.1: **Key deliverables under the recovery and resilience plan in 2022-23**

- Supporting the purchase of 320 000 electric vehicles.
- One million students receiving learning support.
- Start of the pilot programme on carbon contracts for difference.
- Adoption of the second report to the Conference of Minister-Presidents which also covers tackling investment bottlenecks.
- Launch of three IPCEIs on 'hydrogen', 'microelectronics and communication technologies' and 'next generation cloud infrastructure and services'.
- At least 100 of the most important digital administrative services of the Länder and 115 federal government services being implemented nationwide as one-for-all services.

the support of energy-efficient renovation of residential buildings.

A large number of digitalisation projects are expected to advance significantly by the end of 2022, including an IPCEI on microelectronics and communication technologies. A second IPCEI aiming to deliver the next generation of cloud services and infrastructure will foster the industrial deployment of smart cloud and edge solutions. For both IPCEIs, projects are expected to be launched by the end of 2022. By then, Germany is also expected to have advanced the implementation of its Online Access Act by digitalising public services.

The RRP also addresses learning disadvantages, extends the provision of childcare and digitalises and improves the healthcare system, thereby helping implement the European Pillar of Social Rights. The plan provides for additional courses, mentoring and other measures for pupils with a learning backlog, with a focus on core subjects and core skills to tackle learning disparities caused by the COVID-19 crisis. Moreover, the country already took the necessary legislative decisions to provide additional childcare places, thereby facilitating full-time employment of women with caring responsibilities. Furthermore, by the end of 2022, it is expected that funding will have been awarded to at least 70 000 apprentice support applications. The plan also includes measures to digitalise and improve the health system, including public health capacities. By summer 2022, a large part of the EUR 3 billion earmarked for the digitalisation of hospitals is expected to have been allocated.

Measures under the RRR are also underway to facilitate investment and simplify administrative processes for public authorities and businesses, thus promoting productivity. These include reforms to shorten administrative planning and approval procedures, standardise requirements for requesting financing subsidies, accelerate housing construction and increase the number of successful transfers of business ownership to the next generation. In addition, a public consulting agency has been enabled to provide technical assistance to public authorities in implementing their investments, including in digitalisation of schools. Certain pieces of legislation to accelerate planning and approval procedures in the transport sector have already been adopted and now need to be efficiently implemented.

Box 2.2:

Measures in focus: a working group at federal and Länder level to tackle investment bottlenecks

As part of Germany's RRP, a working group, at federal and Länder level, aims to reduce investment barriers and improve administration efficiency.

- accelerating the outflow of grants, including by making grants for the Länder and municipalities as uniform as possible;
- improving the financial support of municipalities;
- improving transfer of business ownership through a dedicated task force;
- revising the Musterbauordnung (model building code);
- strengthening planning and approval authorities;
- improving recruitment of skilled staff;
- accelerating planning, in particular in rail, local public and private transport; and
- streamlining the public participation procedures and simplifying participation through digitalisation.

FURTHER PRIORITIES AHEAD

Beyond those addressed by the RRP, as outlined above, Germany faces additional challenges. Some reforms were put in place recently (see Annex 4 on progress on country-specific recommendations), but further efforts will be required to make progress on numerous priority challenges. These include in particular, improving framework conditions for investing in the green and digital transitions boosting education and skills, improving the tax mix, addressing inequalities and preparing the pension system for an ageing society. Addressing these challenges will also help make further progress in achieving the SDGs, notably those related to inequalities and environmental sustainability.

Removing investment bottlenecks and boosting investments in the green and digital transitions

Persisting investment bottlenecks hamper the full rollout of the investment needed for the twin transition. Implementation barriers continue to thwart public and private investment (see also Section 1). A landmark initiative for the reduction of investment barriers is included in the RRP (see Box 2.1). However, additional actions are needed to further strengthen local administrative capacity (both in terms of technical expertise and human resources) and cooperation across public authorities, improve training and job conditions to attract skilled personnel and simplify administrative procedures.

The existing electricity networks cannot cope with the needs related to the green transition. Germany made efforts to stimulate flexibility solutions for the electricity system. However, investment to expand and reinforce the power grid and to promote responses by energy consumers to varying prices will remain essential in light of increased electricity needs, and variable and decentralised electricity generation. Planned investments have suffered significant delays, and Germany lags significantly behind its targets on the expansion of transmission and distribution networks ([11]). Delays in expanding the electricity networks made it occasionally necessary to curtail renewables in certain areas where the network was regularly overloaded, thereby also affecting the deployment of additional renewable capacity. Delays also affect the networks of neighbouring Member States, since network capacity within Germany is not sufficient to transport the volumes of electricity traded within the German-Luxembourgish price zone. Reasons for delays include numerous and lengthy appeals against grid projects and lack of administrative capacity to authorise such infrastructure projects. The 2021 coalition agreement sets out the intention to speed up planning and permitting procedures for grid expansion. It also tasks transmission system operators and the Federal Network Agency to develop a plan for a climate neutrality grid. However, implementation on the ground will be decisive in accelerating deployment.

Lengthy and complex planning and permitting procedures thwart the deployment of renewable electricity, which is key to reducing dependency on fossil fuels. To achieve its climate targets and reduce dependency on fossil fuel imports, Germany intends to increase the share of

([11]) According to the 2022 state of play report issued by the Ministry for Economic Affairs and Climate Protection (*Eröffnungsbilanz Klimaschutz)* as of 2021, out of a total of 12 241 km power lines according to the law on grid expansion only 1 848 km are in operation and a further 675 km are under construction, while 9 718 km are pending or in the approval process. Bundesministerium für Wirtschaft und Klimaschutz, 2022.

renewables in electricity generation from 42% currently to 80% by 2030 and to almost 100% by 2035. This requires ambitious measures to step up the deployment of renewable electricity as well as to expand and reinforce electricity networks and further promote energy system integration. The removal of implementation barriers to renewable electricity deployment – such as complex and lengthy permit procedures – will also be crucial. In this respect, the main challenges relate to conflicts over land use, the use of spatial planning to identify zones for renewable energy deployment, and minimum distance rules, for instance for wind turbines. Streamlined consultation processes, improved public participation and revenue sharing in projects could increase local acceptance. Digitalising approval procedures and strengthening administrative capacity across different levels of government would further accelerate permitting. Simplified procedures for the permitting of repowering could be explored. In addition, accelerating investment in renewables and electricity networks will require a skilled workforce at different levels of the value chain, including developers, installers, and experts for planning and authorisation.

Stepping up climate measures would reduce Germany's dependency on fossil fuels imports. Oil and gas are the largest sources of energy in Germany with a strong import dependency (89.1% for natural gas and 96.4% for oil and petroleum products in 2020). With a share of 35% of the energy mix (gross inland consumption) oil is the largest source of energy in Germany, with 34% of its imports coming from Russia (compared to an average of 26% for the EU in 2020). Natural gas is the second largest source. The dependency on gas imports from Russia is particularly strong with a share of 65% of gas imports compared with an EU average of 44% in 2020 ([12]). In the short term, reducing energy consumption and diversifying energy supplies and routes, including through accelerated renewables deployment and the use of liquefied natural gas could be considered. Decarbonisation of sectors, including in the industry, should be accelerated, in particular for those relying substantially on gas. In that context, it is important to promote co-benefits of addressing security supply and climate mitigation. Removing bottlenecks and accelerating investments in renewable electricity and electricity networks are crucial to both overcome dependence on fossil fuels imports from Russia and to meet climate targets. This is important also in view of rising energy prices as the increased deployment of renewables and the increase in energy efficiency are expected to lower energy prices and help mitigate the currently very pronounced price volatility of fossil fuels. Energy poverty in Germany stands at 9%, above the EU average (8.2%), and affects low-income groups in particular (see Annex 6). The development of the renewable hydrogen market and the shift to renewable hydrogen could be accelerated. Investments should be future-proof where possible and avoid lock-in effects in view of Germany's objective of climate neutrality by 2045.

Reaching climate and energy targets requires more ambitious action. The climate policy measures in the RRP and other government measures, such as introducing a CO_2 price in the transport and heating sectors, are not sufficient for Germany to reach the ambitious climate and energy targets. Several sectors, including transport and heating, which failed to meet national sector-specific emission targets for 2021, will have to step up efforts to contribute adequately to meeting Germany's 2030 target under the Effort Sharing Regulation ([13]). Beyond the measures introduced in the RRP, boosting a modal shift in transport, in particular towards rail, and increasing the use of public transport, notably by improving the quality of the service, would

([12]) : Eurostat (2020), share of Russian imports over total imports of natural gas, crude oil and hard coal. For the EU27 average, the total imports are based on extra-EU27 imports. For Germany, total imports include intra-EU trade. Crude oil does not include refined oil products. According to recent data published by the German Ministry of Economic Affaires and Climate Action in their Second progress report on energy security from 1 May 2022, the share of Russian gas imports has declined to 35%, from about 55% on average in previous years.

([13]) DIW, 2021; see also Annex 5.

help reduce fuel consumption and dependency on fossil fuels as well as emissions. The introduction of a speed limit would cut fuel consumption and emissions of both greenhouse gases and local air pollutants ([14]). Germany would also benefit from further incentivising investment in energy efficiency of buildings, in particular deeper renovation levels, and accelerating the phase-out of fossil fuel use in buildings. Promoting the circular economy and nature-based solutions ([15]) would further help reach the climate targets. The circular use of material is a major driver for future competitiveness and can help reduce dependency on raw material sources. Germany's circular material use rate has improved, but remains far behind that of EU leaders.

Better framework conditions are key for the digital transition. Despite significant improvements in the overall coverage of very-high-capacity networks, the country is still lagging in deploying them in rural areas. At the same time, only 15.4% of households have access to a fibre connection, placing Germany among the Member States with the lowest fibre coverage (the top five EU performers have a fibre coverage of at least 85%). The coalition agreement includes targets for the nationwide availability of fibre and the latest mobile communications standards, but does not set a deadline to reach them. Increasing building and management capacity in the private sector and planning and implementation capacity in the public sector will be crucial. Meeting the targets will also require improvements in procedures for permit application and granting and the standardisation of alternative, less time-consuming, installation techniques.

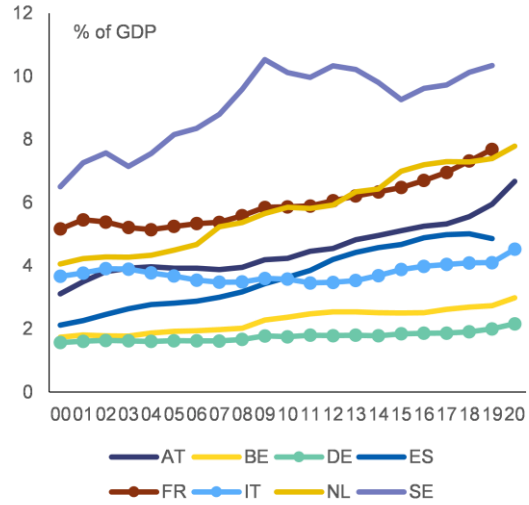
([14]) Based on data by the German Environmental Agency, NGOs such as *Deutsche Umwelthilfe* expect that the introduction of a speed limit could lead to savings of up to 3.7 billion liters of fuel and 9.2 million tones of CO2 per year.

([15]) Nature-based solutions are solutions that are inspired and supported by nature. They are cost-effective climate mitigation measures and help build resilience.

Strengthening productivity through digitalisation, research and innovation, education and skills

There is considerable scope to boost productivity. While the long-term slowdown in productivity is a global phenomenon, there are also country-specific structural issues explaining the long-term decline in labour productivity growth. There is a large investment gap in intangible assets, including research and innovation, software and databases (see Graph 3.1) compared to other EU Member States as well as in skills, which is affecting in particular small and medium-sized businesses (SMEs). The business environment suffers from slow technology diffusion, weaknesses in eGovernment, and low competition in business services, leading to an overall decline in business dynamism ([16]).

Graph 3.1: **Use of software and databases 2000-2020**



Net balance sheet value of software and databases as % of GDP
Source: Eurostat

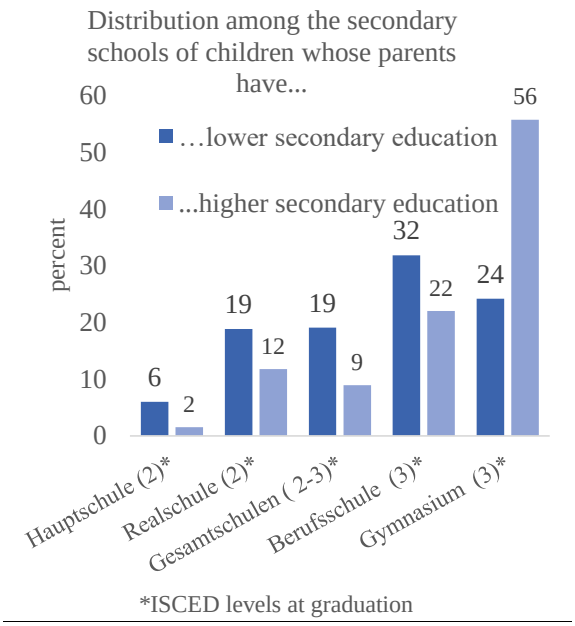
Private investment in research and development (R&D) remains concentrated in large firms. Germany is classed as a *Strong Innovator*, ranking sixth in the 2021 European Innovation Scoreboard, but the lead

([16]) OECD, 2020

over the EU average has been shrinking over the years. SMEs' R&D expenditure, which as a share of GDP is one of the lowest in the EU, fell behind the dynamics of large enterprises over the past decade (see Annex 9). Following a decreasing trend over the previous 15 years, the start-up rate increased slightly in 2019 but then fell again in 2020.

The lack of qualified personnel is the most significant factor hampering SME innovation and digitalisation. High-growth businesses consider the scarcity of staff with the right skills as a major barrier to investment ([17]). While the number of ICT specialists in the workforce is above the EU average, in certain ICT fields Germany faces a significant labour and skills shortage. Currently, the mismatch is particularly high regarding experts in informatics, and software development and implementation. Investment in skills is key in order to achieve the 2030 EU headline target on adult learning.

Graph 3.2: **Inheritability of education**



Source: DESTATIS

The pandemic has aggravated inequalities in educational attainments. Educational outcomes are strongly influenced by socio-economic status and migrant background (see Annex 13). These correlations were strengthened by the pandemic (NETS, 2021). Children of parents with higher secondary education are more likely to succeed in school (see Graph 3.2). 18 to 24-year-olds who were born abroad are three times more likely to leave school without a diploma than children of native-born parents. Improving access to, and quality of, early childhood education and care (especially for under-3-year-olds) and providing all-day schooling would help improve both the educational outcomes of pupils and the full-time participation of women in the labour market, in line with the European Pillar of Social Rights. More and better-qualified teachers and staff can improve pupils' achievements, particularly in schools with many children from disadvantaged backgrounds. However, shortages of staff are widespread as the supply of teachers cannot meet education needs. Improving teachers' digital and pedagogical skills is a priority. Furthermore, measures to support pupils most affected by the pandemic could be stepped up and continued in the coming years, as lost learning opportunities have not been entirely remedied.

A tax mix fostering job-rich, inclusive and sustainable growth

The tax mix holds back hours worked. Taxes and social security contributions are weighing on the cost of labour, while tax bases that are more supportive of inclusive growth remain underused (see Annex 18). Better use of the labour potential, however, is becoming more urgent as population ageing is constraining labour supply in an already tight market. Currently, the interplay between income taxation, social contributions and benefits creates disincentives to increase the hours worked for certain groups, such as low- and middle-income earners, and second earners. This long-standing challenge has been partially addressed through various reforms such as abolition of the solidarity surcharge for most taxpayers, but the problem persists. The tax wedge on labour is among the highest in the EU and the tax-benefit system currently

([17]) Amaral-Garcia et al., 2022

does not provide sufficient incentives to increase the hours worked.

The coalition agreement commits to alleviating the tax burden on very low incomes and second earners and harmonising the tax system with social benefits. From October 2022, the earnings thresholds for *mini-jobs* and *midi-jobs* ([18]), above which full employees' social contributions apply, will be increased. While this may increase take-home pay for very low-income earners, it may keep people working very low hours and limit progression to other types of jobs ([19]). At the same time, the tax wedge for low- and middle-income earners, and for second earners, remains high. Women are particularly affected by the high tax wedge for low-wage and second earners (see Annexes 18 and 12). The timeline and exact procedures of the coalition's commitment to harmonise social assistance, housing benefit and other social benefits are not yet specified. No major reform of the joint income taxation is envisaged, but coalition partners have agreed to attribute the tax advantage of married couples more equally to both spouses and no longer uniquely to the one with the highest earnings. As the application process is burdensome, the already existing option to allocate the tax advantage more equally (*Faktorverfahren*) has been used by less than 1% of married couples. Without a far-reaching reform of joint income taxation major disincentives to work persist ([20]). Further reforms of the tax system could flatten the tax progression curve for middle-income earners (*Mittelstandsbauch*) and shift the tax burden towards other tax bases that are less detrimental to inclusive growth.

The tax system is not sufficiently promoting sustainability. On the revenue side, environmental taxes as a share of GDP are expected to remain considerably below the EU average even after the introduction of the CO_2 price in transport and heating (see Annex 18). Unlike other EU countries, Germany has no tax on pollution and resources use. Vehicle taxation can be reformed to encourage more environmentally friendly mobility, including an increased use of public transport. The effective tax mix also still includes significant environmentally harmful subsidies, including the so-called 'Diesel privilege', and the company car privilege ([21]). The coalition agreement acknowledges the need to address such subsidies, but the timeline and practical follow-up is unclear. Well-designed redistributive measures can help counteract the regressive effects of environmental taxes, as low-income earners spend a higher proportion of their income on environmental taxes compared with high-income earners ([22]).

Preparing the pension system for population ageing

Demographic change puts pressure on public pensions. The working age population is expected to diminish by 3.7 million in the 2020s. The old-age dependency ratio will increase by more than 12 percentage points (pps) to 46.4% in 2030, and is expected to accelerate further to 54.3% by 2060 ([23]). This will considerably increase the financing needs of the first pillar *Rentenversicherung*, a mandatory pay-as-you-go system, which is not deemed sustainable by various experts

([18]) These are labour contracts where employees' social security contributions are reduced compared to regular contracts.

([19]) See also Bruckmeier et al, 2022

([20]) Bach et al. 2022

([21]) Bundesrechnungshof 2022. According to the German Federal Environmental Agency, these subsidies amount to EUR 65 bn. The German Finance Ministry publishes its subsidy report annually. Across these two sources, there are discrepancies as a number of subsidies, including the company car tax benefit (*Dienstwagenprivileg*) or the distance flat rate (*Entfernungspauschale*) listed by the Environmental Agency, are not covered in the annual subsidy report of the Ministry of Finance, due to a narrower definition of subsidies.

([22]) DIW, 2019

([23]) *The 2021 Ageing Report: Economic and Budgetary Projections for the EU Member States (2019-2070).* The old-age dependency ratio shows the ratio between the number of people aged 65 and over and the number of people aged between 20 and 64.

under the current rules ([24]). The situation is aggravated by the expansion of pension benefits over the past years ([25]).

Complementary pension pillars make only a limited contribution to old-age income ([26]). In the occupational system (or the second pillar) the state provides tax incentives for companies to provide a supplementary pension for their employees. However, due to more volatile employment careers, it will be difficult to scale it up. Third pillar private pension schemes (*Riester Rente*) have proven to be ineffective, since the products require investment in low-yielding safe debt and many of them suffer from high fees. As a consequence, the system has failed to adequately incentivise private retirement savings, especially for low-income earners.

Federal transfers to the pay-as-you-go system are expected to increase. Already today, about a quarter of the pay-as-you-go insurance benefits are borne by the federal budget and not by social contributions. The political commitment to the so-called double stop line (*doppelte Halteline*), to neither lower the replacement level, nor increase the contribution rate beyond certain ceilings could result in higher budget contributions.

A combination of measures could alleviate the fiscal burden and make retirement savings more effective. The reactivation of the catch-up factor (*Nachholfaktor*) to prevent pensions from outpacing wage developments from 2022 onwards contributes to fiscal sustainability. In addition, the coalition agreement also includes plans to introduce a capital-based buffer, which could cushion future increases in disbursements. The state-subsidised private pensions could be optimised, including by lowering administrative costs and allowing more freedom in the portfolio allocation, also including higher-yield assets. In the long term, sustainability could be improved by linking retirement age to increases in life expectancy, after it has reached 67 years in 2031. To accompany this, further support could be beneficial to improve employability of older workers, in particular low-skilled ones. Reforms should also take into account distributional effects as the replacement rate for low-income earners is already comparatively low.

([24]) See statements by the German Council of Economic Experts (*Sachverständigenrat*), the independent fiscal institution (*Gemeinschaftsdiagnose*), the Bundesbank, the Board of Economic Advisors of the Ministry for Economic Affairs and Climate Action.

([25]) Notably in the statutory pay-as-you-go system *Rentenversicherung* for certain groups, entitling particularly long-term insured to retire early (*Altersrente für besonders langjährig Versicherte*), mothers to get additional pension entitlements for childrearing years ("*Mütterrente*"). Additional expenditures also stem from the newly introduced *Grundrente*, a top-up for low pensions based on long contribution periods.

([26]) The German pension system is based on a compulsory pay-as-you-go first pillar, an optional occupational second pillar and an optional capital-based third pillar.

KEY FINDINGS

Germany's recovery and resilience plan includes important measures to address a series of its structural challenges:

- investments in building renovations, clean mobility, industry decarbonisation and the hydrogen value chain;
- investments in key advanced technologies and in digital transformation of the automotive industry, healthcare, education, and public administration; and
- actions to tackle the learning disparities exacerbated by the COVID-19 crisis, and the provision of additional childcare places.

Beyond the reforms and investments in the RRP, Germany would benefit from:

- boosting investments and improving framework conditions by accelerating and facilitating planning and permitting procedures for electricity networks and renewable energy generation;
- reducing reliance on fossil fuels and their imports, by diversifying energy supplies and routes, improving energy efficiency, incentivising energy savings, and accelerating decarbonisation in transport and heating;
- better framework conditions for the deployment of very high-capacity digital networks, in rural areas in particular;
- boosting productivity by upskilling the labour force, boosting investment in innovation, in particular among SMEs, and promoting business dynamism;
- addressing inequalities in educational attainment and improving educational outcomes of disadvantaged groups;
- improving the tax mix to promote incentives to increase hours worked, for low- and middle-income earners and second earners in particular, and to promote environmental sustainability, while cushioning regressive effects of environmental taxation; and
- ensuring sustainability of the pension system in light of demographic change.

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ANNEX 1: SUSTAINABLE DEVELOPMENT GOALS

This annex assesses Germany's progress on the Sustainable Development Goals (SDGs) along the four dimensions of competitive sustainability. The 17 SDGs and their related indicators provide a policy framework under the UN's 2030 Agenda for Sustainable Development. The aim is to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind. The EU and its Member States are committed to this historic global framework agreement and to playing an active role in maximising progress on the SDGs. Graph A1.1 is based on the EU SDG indicator set developed to monitor progress on SDGs in an EU context.

Germany performs above the EU average on some SDGs indicators related to environmental sustainability (such as SDG 11) and is improving on others (SDG 12, 13, 7). Germany is improving with regard to affordable and clean energy but the share of renewable energy in gross final energy consumption is below the EU average (at 19.3% against 22.1% for the EU in 2020). Various measures in the recovery and resilience plan (RRP) supporting the use of renewable hydrogen in industry and the transport sector will contribute to greenhouse gas emission reduction and increasing the share of renewable energy.

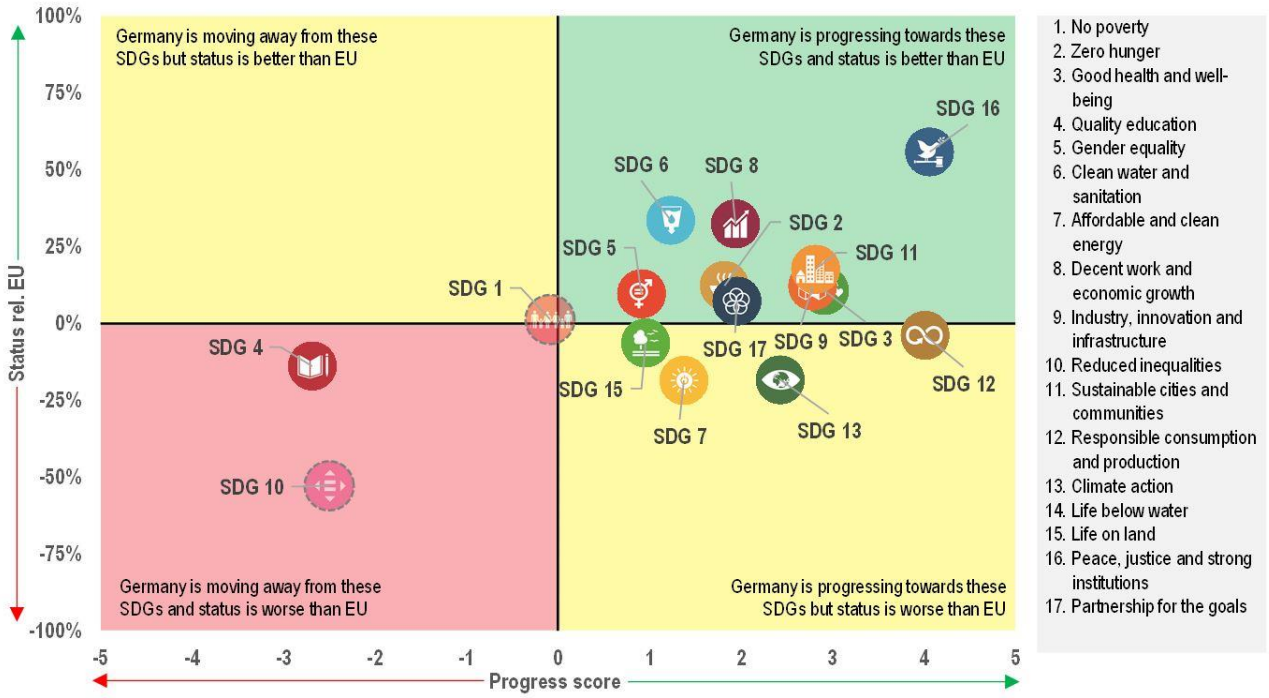
Germany performs well on SDG indicators assessing the fairness of society and economy (SDG 2, 3, 5, 8) but needs to take measures to reduce inequality (SDG 10), improve the quality of education (SDG 4), and address poverty (SDG 1) ([27]). Germany generally performs better than the EU average in domains linked to decent jobs and growth, health and hunger. However, wealth inequality is among the highest in the EU and there has been no progress in reducing income inequality. The income share of the bottom 40% was considerably below the EU average in 2020. The German RRP will contribute to addressing these social challenges with additional courses and mentoring to pupils with a learning backlog to tackle the learning disparities created by the COVID-19 crisis. The plan is also devoting EUR 725 million to supporting apprentices hit by the crisis.

Germany performs above the EU average on SDG indicators related to productivity (SDG 8, 9) and improved its performance. Germany performs above the EU average on 'Decent work and economic growth' (SDG 8) and 'Industry, innovation, and infrastructure' (SDG 9). With 3.14% of GDP allocated to R&D in 2020, Germany has one of the highest R&D spending in the EU. The share of R&D personnel in the active population rose from 1.58% in 2015 to 1.78% in 2020 (EU: 1.44% in 2020). The RRP targets bottlenecks related to the digitalisation of the administration and the economy, for instance by interconnecting business registers to reduce the administrative burden for businesses and citizens.

Germany performs very well on SDG indicators related to macroeconomic stability (SDG 8, 16). Germany performs well on SDG 16 'Peace, justice and strong institutions', showing a stable and secure environment for pursuing economic activities and on SDG 8 'Decent work and economic growth'. Germany halved its long-term unemployment rate from 2.0% in 2015 to 1.1% in 2020 (EU: 2.4% in 2020). The RRP includes a package of reforms to speed up public investment and tackle investment bottlenecks to unlock private investment and reduce the savings-investment imbalance.

([27]) See 'Annex 12 – Employment, skills and social policy challenges in light of the European Pillar of Social Rights' for further information. Due to a change in the methodology, there is a break in the time series for various social and inequality-related indicators between 2019 and 2020.

Graph A1.1: **Progress towards the SDGs in Germany in the last five years**



For detailed datasets on the various SDGs see the annual ESTAT report 'Sustainable development in the European Union', https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-03-21-096; Extensive country specific data on the short-term progress of Member States can be found here: Key findings - Sustainable development indicators - Eurostat (europa.eu)
Source: Eurostat, latest update of 28 April 2022. Data mainly refer to 2015-2020 and 2016-2021.

The Recovery and Resilience Facility (RRF) is the centrepiece of the EU's efforts to support its recovery from the COVID-19 pandemic, to fast forward the twin transition and to strengthen resilience against future shocks. Germany submitted its recovery and resilience plan (RRP) on 28 April 2021. The Commission's positive assessment on 22 June 2021 and the Council's approval on 13 July 2021 paved the way for disbursing grants of EUR 25.6 billion under the RRF over the period 2021-2026. The financing agreement was signed on 20 August 2021. The key elements of the German RRP are set out in Table A2.1. The graph below (A2.1) outlines the share of funds contributing to each of the RRF's six policy pillars.

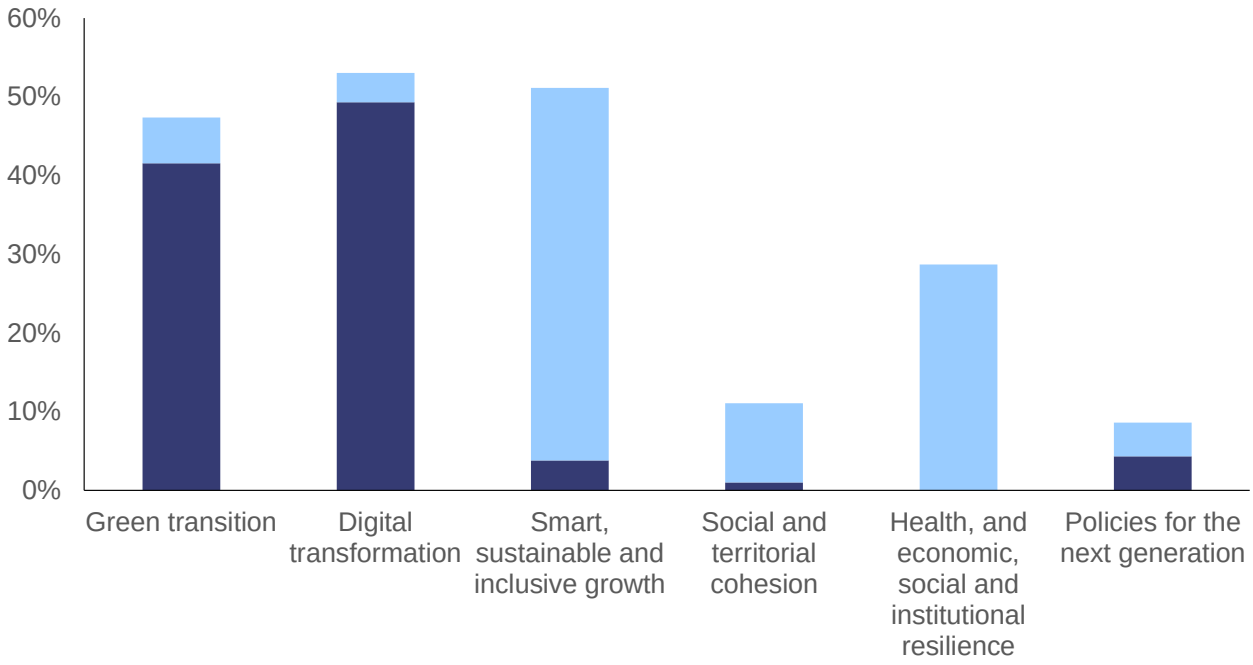
The progress made by Germany implementing its plan is published in the Recovery and Resilience Scoreboard. The scoreboard also gives a clear overview of the progress made in implementing the RRF as a whole.

Table A2.1:**Key elements of the German RRP**

Total allocation	EUR 25.6 billion in grants (0.7% of 2019 GDP)
Investments and Reforms	25 investments and 15 reforms
Total number of Milestones and Targets	129
Estimated macroeconomic impact (1)	Raise GDP by 0.7% by 2026 (0.4% in spillover effects)
Pre-financing disbursed	EUR 2.2 billion (August 2021)
First instalment	Germany did not yet submit a first payment request

(1) See Pfeiffer P., Varga J. and in 't Veld J. (2021), "Quantifying Spillovers of NGEU investment", European Economy Discussion Papers, No. 144 and Afman et al. (2021), "An overview of the economics of the Recovery and Resilience Facility", Quarterly Report on the Euro Area (QREA), Vol. 20, No. 3 pp. 7-16.
Source: European Commission 2022

Graph A2.1: **Share of RRF funds contributing to each policy pillar**



(1) Each measure contributes towards two policy areas of the six pillars, therefore the total contribution to all pillars displayed on this chart amounts to 200% of the estimated cost of the German RRP. The bottom part represents the amount of the primary pillar, the top part the amount of the secondary pillar.
Source: RRF Scoreboard https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/country_overview.html

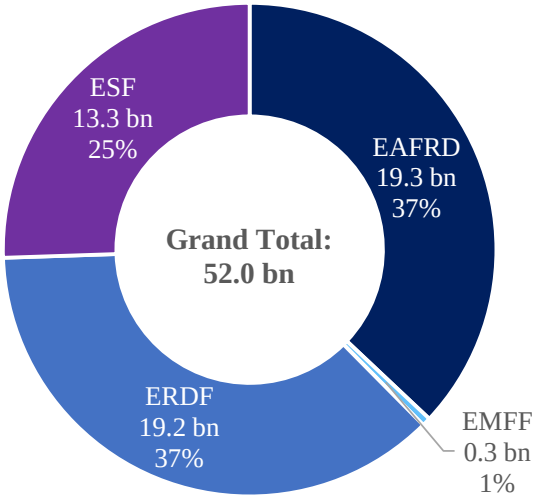
The EU's budget of more than EUR 1.2 trillion for 2021-2027 is the investment lever to help implement EU priorities. Underpinned by an additional amount of about EUR 800 billion through NextGenerationEU and its largest instrument, the Recovery and Resilience Facility, it represents significant firepower to support the recovery and sustainable growth.

In 2021-2027, EU cohesion policy funds ([28]) will support Germany's long-term development objectives by investing EUR 20.94 billion ([29]) including EUR 2.8 billion from the Just Transition Fund to alleviate the socio-economic impacts of the green transition in the most vulnerable regions. Partnership agreements and programmes under the 2021-2027 cohesion policy funds take into account the 2019-2020 country-specific recommendations and investment guidance provided as part of the European Semester, ensuring synergies and complementarities with other EU funds. In addition, Germany will benefit from EUR 30.6 billion support for the 2023-27 period from the Common Agricultural Policy, which supports social, environmental, and economic sustainability and innovation in agriculture and rural areas, contributing to the European Green Deal, and ensuring long-term food security.

For the programming period 2014-2020 ([30]), the European Structural and Investment Funds (ESIF) for Germany are set to invest EUR 33.50 billion ([31]) national financing amounts to EUR 52.01 billion (Graph 3.1), representing around 0.23% of GDP for 2014-2020 and 8.38% of public investment ([32])(in total EUR 29.7 billion). By end 2020, Cohesion policy investments supported 44 960 businesses, the creation of more than 13 000 direct jobs, the development of new to the markets products by more than 1 600 businesses, the gain of new qualifications by 1.18 million people, and the reduction of GHG emissions by almost 262 thousand tons of CO_2 equivalents per year. European Social Fund policy investments supported more than 2.7 million participants in funded projects, through which more than 587 000 gained a qualification in educational or vocational training and more than 106 000 were in employment after a social inclusion project.

Cohesion policy funds already substantially contribute to the Sustainable Development Goal objectives. In Germany, cohesion policy funds support 10 of the 17 SDGs with up to 97% of expenditure contributing to the attainment of the goals.

Graph A3.1: **2014-2020 European Structural and Investment Funds in Germany – total budget by fund**



EUR billion in current prices, % of total
Source: European Commission, Cohesion Open Data

The REACT-EU instrument (Recovery Assistance for Cohesion and the Territories of Europe) under NextGenerationEU provided EUR 2.1 billion of additional funding to 2014-2020 cohesion policy allocations for Germany. This will contribute to objectives such as to ensure a balanced recovery, boost convergence and provide vital support to regions following the coronavirus outbreak. REACT-EU provided support in Germany to organise the vaccination campaign, improve research facilities in the health sector, strengthen education,

([28]) European Regional Development Fund (ERDF), European Social Fund+ (ESF+), Cohesion Fund (CF), Just Transition Fund (JTF), Interreg.

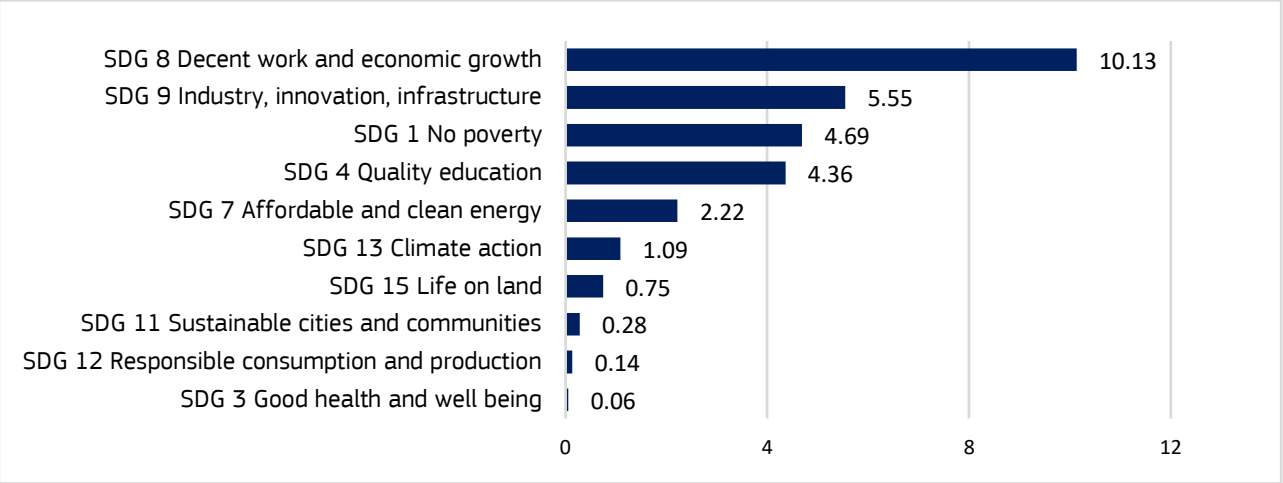
([29]) Current prices, source: Cohesion Open Data

([30]) The data for the EAFRD refers to the period 2014-2022

([31]) ESIF includes cohesion policy funds (ERDF, ESF+, CF, Interreg), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF). According to the 'N+3 rule', the funds committed for the for 2014-2020 must be spent by 2023 at the latest (by 2025 for EAFRD). Data source: Cohesion Open data, cut-off date 31.12.2021 for ERDF, ESF+, CF, Interreg; cut-off date 31.12.2020 for EAFRD and EMFF.

([32]) Including REACT-EU. ESIF data on https://cohesiondata.ec.europa.eu/countries/DE

Graph A3.2: **Cohesion policy contribution to the SDGs (EUR billion)**



Source: European Commission

including IT equipment, provide additional support to SMEs, training and skills development, active inclusion and to promote energy efficiency.

The Coronavirus Response Investment Initiative ([33]) provided the first EU emergency support to Germany in relation to the COVID-19 pandemic. It introduced extraordinary flexibility enabling Germany to re-allocate resources for support to businesses (EUR 70 million). For instance, Germany supported purchase of protective equipment, healthcare supplies and IT equipment for the health care sector, and supported innovation in SMEs. Germany also benefited from the temporary 100% EU financing of incurred measures in cohesion policy, with approximately EUR 261 million in 2021 through 100% co-financing.

The Commission provides tailor-made expertise via the Technical Support Instrument (TSI) and the Horizon Policy Support Facility (PSF) to support Germany design and implement growth-enhancing and R&I-specific reforms respectively, including implementing its RRP. Germany has received assistance, since 2018, through nine technical support projects under the TSI and, since 2016, seven under the PSF–Mutual Learning Exercises in R&I policy learning. TSI projects delivered in 2021 aimed, for example, to support the Federal Ministry of Health in the implementation of the national genome initiative (genomDE) and the Federal Financial Supervisory Authority (BaFin) in the digitalisation of supervisory procedures. The Commission also supported Bavaria and North Rhine-Westphalia with their digital upskilling strategies and Brandenburg in strengthening their education system. In 2022, new projects will start to improve, for example, overall RRP monitoring frameworks and bring gender mainstreaming into public policy and budget processes.

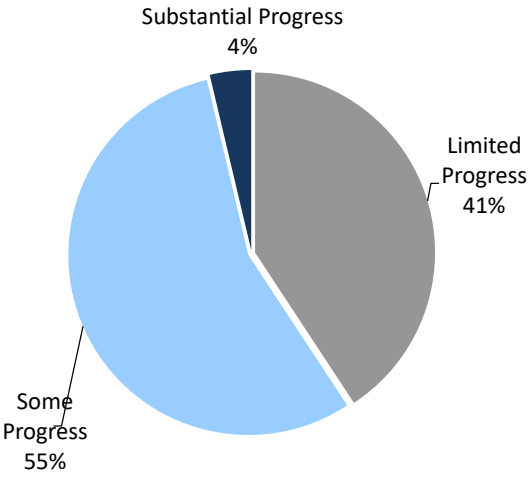
Germany also benefits from other EU programmes, such as the Connecting Europe Facility and Horizon 2020. The Connecting Europe Facility allocated EU funding of EUR 2.4 billion to specific projects on strategic transport networks. Horizon 2020 allocated EU funding of EUR 9.97 billion.

([33]) Re-allocating ESIF resources according to Regulation (EU) 2020/460 of the European Parliament and of the Council of 30 March 2020, and Regulation (EU) 2020/558 of the European Parliament and of the Council of 23 April 2020.

ANNEX 4: PROGRESS IN THE IMPLEMENTATION OF COUNTRY-SPECIFIC RECOMMENDATIONS

The Commission assessed the 2019-2021 country-specific recommendations (CSRs) ([34]) addressed to Germany in the context of the European Semester. The assessment takes into account the policy action taken by Germany to date ([35]), as well as the commitments in the recovery and resilience plan (RRP) ([36]). At this early stage of the RRP implementation, overall 59% of the CSRs focusing on structural issues in 2019 and 2020 have recorded at least "some progress", while 41% recorded "limited" (see Graph 4.1). Considerable additional progress in addressing structural CSRs is expected in the years to come with the further implementation of the RRP.

Graph A4.1: **Germany's progress on the 2019-2020 CSRs (2022 European Semester cycle)**



Source: European Commission

([34]) 2021 CSRs: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H0729%2805%29&qid=1627675454457

2020 CSRs: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020H0826%2805%29&qid=1526385017799

2019 CSRs: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019H0905%2805%29&qid=1526385017799

([35]) Incl. policy action reported in the National Reform Programme, as well as in the RRF reporting (bi-annual reporting on the progress with implementation of milestones and targets and resulting from the payment request assessment).

([36]) Member States were asked to effectively address all or a significant subset of the relevant country-specific recommendations issued by the Council in 2019 and 2020 in their RRPs. The CSR assessment presented here takes into account the degree of implementation of the measures included in the RRP and of those done outside of the RRP at the time of assessment. Measures foreseen in the annex of the adopted Council Implementing Decision on the approval of the assessment of the RRP which are not yet adopted nor implemented but considered as credibly announced, in line with the CSR assessment methodology, warrant "limited progress". Once implemented, these measures can lead to "some/substantial progress" or "full implementation", depending on their relevance.

Table A4.1:**Progress on CSRs and RRP coverage**

Germany	Assessment in May 2022*	RRP coverage of CSRs until 2026
2019 CSR1	**Some Progress**	
While respecting the medium-term budgetary objective, use fiscal and structural policies to achieve a sustained upward trend in private and public investment, in particular at regional and municipal level.	Some Progress	Relevant RRP measures planned as of 2020, 2021, 2022, 2023
Focus investment-related economic policy on education;	Limited Progress	Relevant RRP measures planned as of 2020, 2021 and 2022.
research and innovation;	Some Progress	Relevant RRP measures planned as of 2020, 2021, 2022 and 2023.
digitalisation and very-high capacity broadband;	Some Progress	Relevant RRP measures planned as of 2020, 2021 and 2022.
sustainable transport	Some Progress	Relevant RRP measures planned as of 2020 and 2021.
as well as energy networks	Limited Progress	Relevant RRP measures planned as of 2020, 2021 and 2023.
and affordable housing, taking into account regional disparities.	Limited Progress	Relevant RRP measures planned as of 2021.
Shift taxes away from labour to sources less detrimental to inclusive and sustainable growth.	Some Progress	Relevant RRP measures planned as of 2021.
Strengthen competition in business services and regulated professions.	Limited Progress	
2019 CSR 2	**Some Progress**	
Reduce disincentives to work more hours,	Some Progress	Relevant RRP measures planned as of 2021
including the high tax wedge, in particular for low-wage	Some Progress	Relevant RRP measures planned as of 2020, 2021
and second earners.	Limited Progress	Relevant RRP measures planned as of 2020, 2021
Take measures to safeguard the long-term sustainability of the pension system, while preserving adequacy.	Limited Progress	Relevant RRP measures planned as of 2021
Strengthen the conditions that support higher wage growth, while respecting the role of the social partners.	Substantial Progress	Relevant RRP measures planned as of 2021
Improve educational outcomes and skills levels of disadvantaged groups.	Limited Progress	Relevant RRP measures planned as of 2020, 2021, 2022
2020 CSR1	**Some Progress**	
Take all necessary measures, in line with the general escape clause of the Stability and Growth Pact, to effectively address the COVID-19 pandemic, sustain the economy and support the ensuing recovery. When economic conditions allow, pursue fiscal policies aimed at achieving prudent medium-term fiscal positions and ensuring debt sustainability, while enhancing investment.	Not relevant anymore	Not applicable
Mobilise adequate resources and strengthen the resilience of the health system, including by deploying e-health services.	Some Progress	Relevant RRP measures planned as of 2020, 2021 and 2022.
2020 CSR2	**Some Progress**	
Front-load mature public investment projects	Some Progress	Relevant RRP measures planned as of 2020, 2021, 2022
and promote private investment to foster the economic recovery.	Some Progress	Relevant RRP measures planned as of 2020, 2021, 2022
Focus investment on the green and digital transition, in particular on sustainable transport,	Some Progress	Relevant RRP measures planned as of 2020 and 2021.
clean, efficient and integrated energy systems,	Limited Progress	Relevant RRP measures planned as of 2020, 2021 and 2023.
digital infrastructure and skills,	Some Progress	Relevant RRP measures planned as of 2020, 2021 and 2022.
housing,	Limited Progress	Relevant RRP measures planned as of 2021.
education	Limited Progress	Relevant RRP measures planned as of 2020, 2021 and 2022.
and research and innovation.	Some Progress	Relevant RRP measures planned as of 2020, 2021, 2022 and 2023.
Improve digital public services across all levels	Limited Progress	Relevant RRP measures planned as of 2021 and 2022.
and foster the digitalisation in SMEs.	Some Progress	Relevant RRP measures planned as of 2020 and 2021.
Reduce the regulatory and administrative burden for businesses.	Some Progress	Relevant RRP measures planned as of 2020, 2021, 2022.
2021 CSR1	**Substantial Progress**	
In 2022, maintain a supportive fiscal stance, including the impulse provided by the Recovery and Resilience Facility, and preserve nationally financed investment.	Full Implementation	Not applicable

(Continued on the next page)

Table (continued)

When economic conditions allow, pursue a fiscal policy aimed at achieving prudent medium-term fiscal positions and ensuring fiscal sustainability in the medium term.	Substantial Progress	Not applicable
At the same time, enhance investment to boost growth potential. Pay particular attention to the composition of public finances, on both the revenue and expenditure sides of the budget, and to the quality of budgetary measures in order to ensure a sustainable and inclusive recovery. Prioritise sustainable and growth-enhancing investment, in particular investment supporting the green and digital transition.	Some Progress	Not applicable
Give priority to fiscal structural reforms that will help provide financing for public policy priorities and contribute to the long-term sustainability of public finances, including, where relevant, by strengthening the coverage, adequacy and sustainability of health and social protection systems for all.	Limited Progress	Not applicable

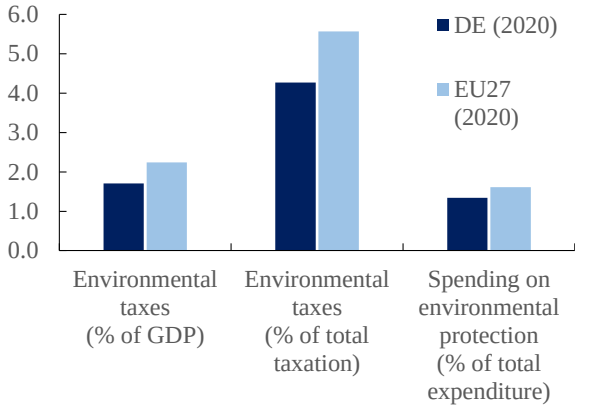
* See footnote [36]

Source: European Commission

ANNEX 5: GREEN DEAL

The European Green Deal intends to transform the EU into a fair and prosperous society with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. This annex offers a snapshot of the most significant and economically relevant developments in Germany in the respective building blocks of the European Green Deal. It is complemented by Annex 6 on the employment and social impact of the green transition and Annex 7 for circular economy aspects of the Green Deal.

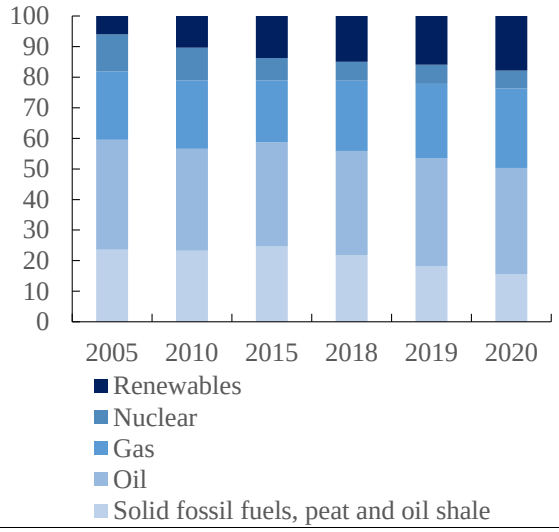
Graph A5.1: **Fiscal aspects of the green transition Taxation and government expenditure on environmental protection**



Source: Eurostat

Achieving Germany's domestic and European climate ambitions will require sustained efforts. In July 2021, Germany amended its climate law, thereby committing to climate neutrality by 2045 and to greenhouse gas emission reductions of -65% compared to 1990 levels by 2030. In 2020, Germany's total greenhouse gas emissions excluding the LULUCF ([37]) sector showed a decrease of -40% since 1990. In the sectors not covered by the EU Emission Trading System, emissions were only cut by -12% relative to 2005 levels and remained higher than those resulting from Germany's 2020 target of -14% reductions. Transport emissions increased slightly in 2020 relative to 2019, despite the COVID-19 crisis. With existing measures, Germany would underachieve its current 2030 effort sharing target of -38% relative to 2005 emission levels by 9 p.p. The proposed new effort-sharing target for Germany in the 'Fit for 55' framework is -50%. In its recovery and resilience plan (RRP), Germany allocates 42% of the plan to climate objectives and outlines crucial reforms and investments to further the transition to a more sustainable, low-carbon and climate-resilient economy ([38]).

Graph A5.2: **Share in energy mix (solids, oil, gas, nuclear, renewables)**



(1) The energy mix is based on gross inland consumption, and excludes heat and electricity. The share of renewables includes biofuels and non-renewable waste.
Source: Eurostat

The ratio of environmental taxation revenues to total taxes as well as in terms of GDP is below the EU average and continues to decrease. The share of environmental taxes is particularly low in the domain of pollution and resources ([39]). The share of expenditure on environmental protection in total government expenditure is increasing, while remaining below the EU average. With insurance cover penetration at a medium level, public budgetary risks are low to medium in Germany, even if the summer floods showed that at regional level risk can still be significant.

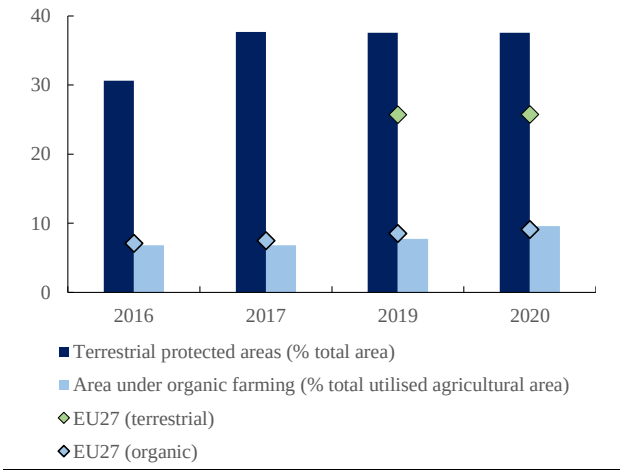
([37]) Land use, land-use change and forestry.

([38]) The share of financial allocation contributing to climate objectives has been calculated using Annex VI of the RRF Regulation.

([39]) For more information on taxation see Annex 18.

In 2020, Germany's energy mix was still dominated by fossil fuels. The energy carriers constituting the highest percentages are oil and petroleum products (excluding biofuel portion), with 35% and natural gas with 26% (slight increase over the past decade for both). These were followed by renewables and biofuels, and solid fuels (dominantly coal and lignite) with 18% and 16% of the energy mix, respectively. The share of nuclear energy was almost halved over the last decade, leading the way to the full phase-out of nuclear energy planned for later this year. Streamlining planning and permitting procedures for electricity networks and renewable energy generation would support wider and faster deployment of wind and solar renewable energy sources.

Graph A5.3: **Terrestrial protected areas and organic farming**

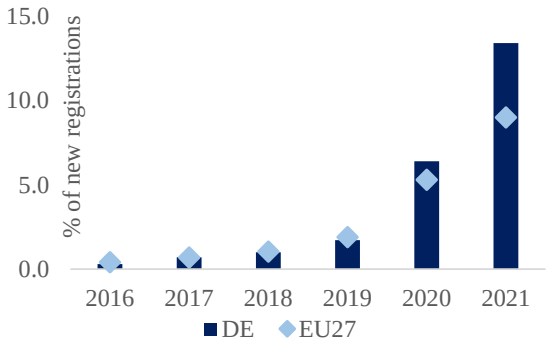


(1) For terrestrial protected areas data for 2018, and data for the EU average (2016, 2017) is lacking.
Source: EEA (terrestrial protected areas) and Eurostat (organic farming).

Despite local successes, and a variety of funding programmes, adopted actions were not sufficient to halt the loss of biodiversity. Some 30% of habitats covered by the Habitats Directive have a good conservation status, with 32% having poor and 37% having bad conservation status. Only around 10% of habitats that have an unfavourable conservation status show improving trends. The main pressures on biodiversity come from agriculture in the form of changes of agricultural practices and intensification, land-take, and regulation of rivers for navigation and flood defence ([40]).

Emissions of several air pollutants have decreased significantly in Germany, but air quality in larger agglomerations gives continued cause for serious concern. The current submission of air pollutant emission projections does not demonstrate compliance with the emission reduction commitments for NOX and for the emission reduction commitment for PM2.5 from 2030 onwards. According to the last report on the implementation of the Nitrates Directive groundwater quality has not improved and water pollution by nitrates remains a serious concern, especially in pollution hotspots.

Graph A5.4: **Share of zero emission vehicles (% of new registrations)**



(1) Zero emission vehicles (passenger cars) include battery and fuel cell electric vehicles (BEV, FCEV).
Source: European Alternative Fuels Observatory. Zero emission vehicles include battery and fuel cell electric vehicles (BEV, FCEV)

More efforts are needed to promote sustainable mobility and decarbonise the transport sector. Germany's car market has a fast-progressing share of electric passenger cars, compared to the EU average. However, more efforts are needed to increase the use of sustainable public transport and promote a modal shift, in particular towards rail, for both passenger and freight transport. More than half of the railway network in Germany is electrified. However, this is below the EU average. An increase in the use of public transport can be achieved by improving the quality of the service. This will improve road congestion, where Germany scores worse than the EU average, and will reduce dependence on fossil fuels.

([40]) European Environment Agency, 2020

Table A5.1:**Key economic and financial indicators**

						Target	Distance		'Fit for 55' Target	'Fit for 55' Distance	
			2005	2019	2020	2030	WEM	WAM	2030	WEM	WAM
Progress to policy targets	Non-ETS GHG emission reduction target [1]	MTCO2 eq; %; pp [2]	484.7	-7%	-12%	-38%	-9	-9	-50%	-21	-21

			2005	2016	2017	2018	2019	2020	National contribution to 2030 EU target
Progress to policy targets	Share of energy from renewable sources in gross final consumption of energy [1]	%	7%	15%	15%	17%	17%	19%	30%
	Energy efficiency: primary energy consumption [1]	Mtoe	321.6	297.6	298.1	292.0	285.2	262.3	216.0
	Energy efficiency: final energy consumption [1]	Mtoe	219.7	216.9	218.6	215.2	214.7	201.7	185.0

			GERMANY						EU		
			2015	2016	2017	2018	2019	2020	2018	2019	2020
Fiscal and financial indicators	Environmental taxes (% of GDP)	% of GDP	1.9	1.9	1.8	1.8	1.8	1.7	2.4	2.4	2.2
	Environmental taxes (% of total taxation)	% of taxation [3]	5.0	4.8	4.6	4.5	4.4	4.3	6.0	5.9	5.6
	Government expenditure on environmental protection	% of total exp.	1.26	1.25	1.24	1.30	1.34	1.34	1.66	1.70	1.61
	Investment in environmental protection	% of GDP [4]	0.37	0.37	0.37	0.39	-	-	0.42	0.38	0.41
	Fossil fuel subsidies	EUR2020bn	12.90	13.40	13.30	12.84	12.10	-	56.87	55.70	-
	Climate protection gap [5]	score 1-4	1.6 out of 4 (slight increase from historical level of 1.5). This is a low/medium risk category (4 being a high risk).								
Climate	Net GHG emissions	1990 = 100	72	73	73	70	67	60	79	76	69
	GHG emissions intensity of the economy	kg/EUR'10	0.35	0.34	0.33	0.31	0.29	0.28	0.32	0.31	0.30
	Energy intensity of the economy	kgoe/EUR'10	0.11	0.11	0.11	0.11	0.10	0.10	0.12	0.11	0.11
Energy	Final energy consumption (FEC)	2015=100	100.0	101.9	102.8	101.1	100.9	94.8	103.5	102.9	94.6
	FEC in residential building sector	2015=100	100.0	103.6	103.3	101.6	105.1	105.5	101.9	101.3	101.3
	FEC in services building sector	2015=100	100.0	98.7	98.6	89.5	85.3	82.9	102.4	100.1	94.4
Pollution	Smog-precursor emission intensity (to GDP) [4]	tonne/EUR'10 [6]	0.83	0.76	0.76	0.77	0.71	-	0.99	0.93	-
	Years of life lost caused due to air pollution by PM2.5	per 100.000 inh.	786	720	777	859	676	-	863	762	-
	Years of life lost due to air pollution by NO2	per 100.000 inh.	165	144	132	125	75	-	120	99	-
	Nitrate in ground water	mg NO3/litre	26.9	27.9	27.3	27.1	26.3	-	21.7	20.7	-
Biodiversity	Terrestrial protected areas	% of total	-	30.6	37.7	-	37.6	37.6	-	25.7	25.7
	Marine protected areas	% of total	-	45.9	-	-	45.9	-	-	10.7	-
	Organic farming	% of total utilised agricultural area	6.3	6.8	6.8	7.3	7.8	9.6	8.0	8.5	9.1

			2000-2006	2006-2012	2012-2018	00-06	06-12	12-18
	Net land take	per 10,000 km2	12.9	9.4	7.3	13.0	11.0	5.0

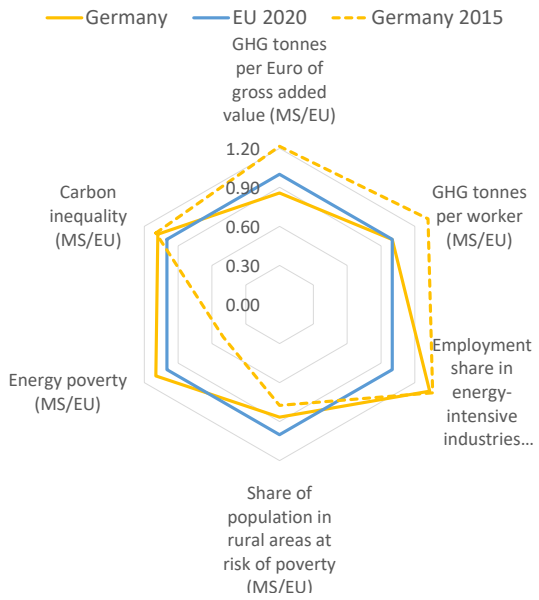
			2015	2016	2017	2018	2019	2020	2018	2019	2020
Mobility	GHG emissions intensity of transport (to GVA) [7]	kg/EUR'10	0.91	0.88	0.92	0.91	0.86	0.74	0.89	0.87	0.83
	Share of zero emission vehicles [8]	% in new registrations	0.4	0.3	0.7	1.0	1.7	6.6	1.0	1.9	5.4
	Number of plug-in electric vehicles per charging point		9	5	5	6	7	14	8	8	12
	Share of electrified railways	%	52.4	52.8	52.9	52.9	53.1	-	55.6	56.0	-
	Congestion (average number of hours spent in road congestion per year by a representative commuting driver)		29.6	29.5	29.9	29.3	29.4	-	28.9	28.8	-

			Year	DE	EU
Digital	Share of smart meters in total metering points [9] - electricity	% of total	2018	0.0	35.8
	Share of smart meters in total metering points [9] - gas	% of total	2018	0.0	13.1
	ICT used for environmental sustainability [10]	%	2021	56.9	65.9

Source: (1) The 2030 non-ETS GHG target is based on the Effort Sharing Regulation. The FF55 targets are based on the COM proposal to increase EU's climate ambition by 2030. Renewables and Energy Efficiency targets and national contributions under the Governance Regulation (Regulation (EU) 2018/1999). (2) Distance to target is the gap between Member States' 2030 target under the Effort Sharing Regulation and projected emissions, with existing measures (WEM) and with additional measures (WAM) respectively, as a percentage of 2005 base year emissions. (3) Percentage of total revenues from taxes and social contributions (excluding imputed social contributions). Revenues from the ETS are included in environmental tax revenues (in 2017 they amounted to 1.5% of total environmental tax revenues at the EU level). (4) Covers expenditure on gross fixed capital formation to be used for the production of environmental protection services (i.e. abatement and prevention of pollution) covering all sectors, i.e. government, industry and specialised providers. (5) The climate protection gap indicator is part of the European adaptation strategy (February 2021), and is defined as the share of non-insured economic losses caused by climate-related disasters.
(6) Sulphur oxides (SO2 equivalent), Ammonia, Particulates < 10µm, Nitrogen oxides in total economy (divided by GDP).
(7) Transportation and storage (NACE Section H). (8) Zero emission vehicles include battery electric vehicles (BEV) and fuel cell electric vehicles (FCEV). (9) European Commission Report (2019) 'Benchmarking smart metering deployment in the EU-28'.
(10) European Commission (2021). Each year the DESI is re-calculated for all countries for previous years to reflect any possible change in the choice of indicators and corrections to the underlying data. Country scores and rankings may thus differ compared with previous publications.
Source: Eurostat, JRC, European Commission, EEA, EAFO.

The green transition not only encompasses improvements to environmental sustainability, but also includes a significant social dimension. While measures in this regard include the opportunity for sustainable growth and job creation, it must also be ensured that no one is left behind and all groups in society benefit from the transition. Germany's green transition is progressing but facing diverse challenges across regions. The energy-intensive sectors are still sizeable and some social challenges persist.

Graph A6.1: **Fair green transition challenges**



Source: Eurostat, World Inequality Database

Germany's recovery and resilience plan (RRP) outlines important reforms and investments for a fair green transition. The RRP focuses support on sustainable mobility and emission reductions via a support scheme as well as a tax exemption for e-vehicles. A measure to renovate the building stock aims at increasing energy efficiency. Measures for skills development are meant to prevent job losses and facilitate job-to-job transitions alongside decarbonisation. In synergy with the European Social Fund (ESF+), the Just Transition Fund (EUR 2.25 billion; 2018 prices) will help mitigate the social-economic impact of the green transition and dedicate resources to green skills. Germany's integrated national energy and climate plan (NECP) of 11 June 2020 partially addresses the recommendation by the Commission to integrate fairness aspects in the energy transition and describe the social, employment and skills impacts of the planned measures. It projects the creation of 185 000 additional jobs by 2030.

Although key energy-intensive sectors remain sizeable, the green economy has the potential to grow and contribute to job creation. The greenhouse gas (GHG) emissions intensity of the German economy decreased significantly between 2015 and 2020 and is at 86% of the EU average (0.23 kilotonnes per million EUR of gross value added), with the average carbon footprint per worker at 13.60 tons of GHG emissions, broadly in line with the EU average of 13.61 (see Graph A6.1). The coal/lignite and fossil fuel based energy production sectors are in decline ([41]), with risks of job losses in fossil fuel and related industries such as mining or combustion engine car manufacturing. Germany's energy-intensive industry, including metals, chemicals and paper ([42]), provides jobs for 4% of the workforce, for which up- and reskilling could be particularly important (see Annex 13). At the same time, the environmental goods and services sector provides jobs to a relatively limited share of the employed population (1.4% vs 2.1% in the EU) ([43]). Overall, Germany has average potential for solar-based renewables production (417 MWh/km2 compared to 420 MWh/km2 for the EU average), while northern Germany has above average potential for onshore wind power (678 MWh/km2 compared to 125 MWh/km2 for the whole country and 357 MWh/km2 as the EU average). These sectors, as well as energy efficiency improvements, offer further opportunities for green jobs ([44]). At the moment, particular labour shortages linked to the transition to a climate-neutral economy are reported in the construction industry. In 2020, 62% of construction companies reported labour shortages. According to forecasts, the energy related renovation and modernisation of buildings will

([41]) SWD(2021) 275 final.

([42]) 2020 European Semester: Overview of Investment Guidance on the Just Transition Fund 2021-2027 per Member State (Annex D).

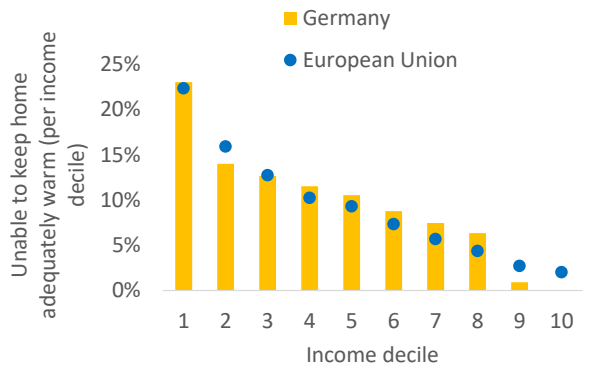
([43]) There is currently no common EU-wide definition of green jobs. The environmental goods and services sector (EGSS) accounts only report on an economic sector that generates environmental products, i.e. goods and services produced for environmental protection or resource management.

([44]) On the identification and measurement of green jobs see: https://publications.jrc.ec.europa.eu/repository/handle/JRC126681. See also: https://publications.jrc.ec.europa.eu/repository/handle/JRC126047.

lead to the creation of 80,000 additional jobs by 2025 ([45]).

The social dimension of the green transition may become an important challenge. This involves ensuring access to essential transport and energy services. In 2020, the share of rural population at risk of poverty was slightly lower than the EU average (16.2% vs 18.7%) ([46]). The share of the population being unable to keep their homes adequately warm declined from 2015 to 2019 and stood at 9% in 2020 ([47]), which is above the EU average (8.2%) (see Graph A6.2). While low-income earners are most affected by the green transition, their carbon footprint is lower than that of higher-income earners. The average carbon footprint of the top 10% of emitters is almost 6 times higher than that of the bottom 50% of the population (5.3 times in the EU), which is almost unchanged since 2015.

Graph A6.2: **Energy poverty by income decile**



Source: Eurostat EU-SILC survey (2020)

Tax systems are key to ensuring a fair transition towards climate neutrality ([48]). Germany's revenues from total environmental taxes decreased from 1.92% of GDP in 2015 to 1.76% in 2019, and 1.71% in 2020 (against 2.24% in the EU). The labour tax wedge for low-income earners decreased only slightly from 42.1% in 2015-2019 to 41.6% in 2020 (compared to 31.6% in the EU, see Annex 18). Redistributive measures accompanying environmental taxation have the potential to foster progressivity and can have a positive impact on the disposable income of households in the bottom of the income distribution ([49]).

([45]) Bundesministerium für Arbeit und Soziales (2021); DIHK (2020)

([46]) As a proxy for potential transport challenges in the context of the green transition (see COM(2021) 568 final).

([47]) The comparison of 2020 values with previous years is affected by a methodological change in the collection of SILC data.

([48]) COM(2021) 801 final.

([49]) SWD(2021) 641 final PART 3/3.

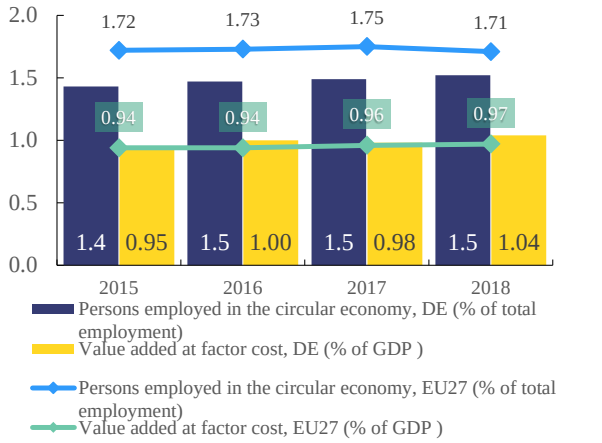
ANNEX 7: RESOURCE EFFICIENCY AND PRODUCTIVITY

The efficient use of resources is key to ensuring competitiveness and open strategic autonomy, while minimising the environmental impact. The green transition presents a major opportunity for European industry by creating markets for clean technologies and products. It will have an impact across the entire value chain in sectors such as energy and transport, construction and renovation, food and electronics, helping create sustainable well-paid local jobs across Europe.

Germany's circular material use rate has steadily improved over the past decade. The circular (secondary) use of material in Germany increased from 11.4% in 2017 to 12% in 2020, slightly below the EU average of 12.8%. Germany remains far behind EU leaders Netherlands (30.9%), Belgium (23%), and France (22.2%).

Resource productivity in Germany is above the EU average. Resource productivity, the efficiency of use of material resources to produce wealth, continuously increased over the last decade, with a slight reduction in 2020. Improving resource productivity can help to minimise negative impacts on the environment and reduce dependency on volatile raw material markets.

Graph A7.1: **Economic importance and expansion of the circular economy – employment and value added in the circular economy sectors**



Source: Eurostat

Germany seems to be on track in decoupling economic growth from the generation of waste. Since 2014, Germany´s total waste generation has remained steady overall, but for some waste types such as plastic packaging there has been a steep increase. Given that gross

Table A7.1:**Selected resource efficiency indicators**

SUB-POLICY AREA	2015	2016	2017	2018	2019	2020	EU27	EU 27
Circularity								
Resource Productivity (Purchasing power standard (PPS) per kilogram)	2.3	2.3	2.4	2.5	2.7	2.8	2.2	2020
Material Intensity (kg/EUR)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	2020
Circular Material Use Rate (%)	10.7	11.2	11.4	11.1	11.5	12.0	12.8	2020
Material footprint (Tones/capita)	15.2	15.8	16.0	16.0	15.1	-	14.6	2019
Waste								
Waste generation (kg/capita, total waste)	-	4 858	-	4 891	-	-	5 234	2018
Landfilling (% of total waste treated)	-	18.1	-	18.4	-	-	38.5	2018
Recycling rate (% of municipal waste)	66.7	67.1	67.2	67.1	66.7	67	47.8	2020
Hazardous waste (% of municipal waste)	-	5.8	-	6.0	-	-	4.3	2018
Competitiveness								
Gross value added in environmental goods and services sector (% of GDP)	1.8	1.9	1.9	2.0	2.0	-	2.3	2019
Private investment in circular economy (% of GDP)	0.1	0.1	0.1	0.1	-	-	0.1	2018

Source: Eurostat

domestic product continued to grow, the trend indicates that economic growth is decoupling from waste generation. Still, given the overall high level of municipal waste, waste prevention measures have not been impactful enough.

Further measures can help Germany maintain its leading position in environmental technology. This affects notably sustainable product design, resource-efficient production processes, digital solutions, industrial symbiosis, remanufacturing in key value chains, alternatives to unsustainable extraction of raw materials and new circular business models. There is also scope to shift reusable and recyclable waste away from incineration, including through economic instruments, to ensure that the post-2020 recycling targets are met.

The Digital Economy and Society Index (DESI) monitors EU Member States' digital progress. The areas of human capital, digital connectivity, the integration of digital technologies by businesses and digital public services reflect the Digital Decade's four cardinal points **([50]).** This Annex describes Germany's DESI performance. Under its recovery and resilience plan, Germany dedicates more than 50% of its budget to the digital transformation (one of the highest of any plan) and invests in all digital areas except digital connectivity, which is addressed by national funds ([51]).

Germany has a mixed performance in the DESI dimension on human capital. The country scores below the EU average in basic digital skills, but above average for the percentage of ICT specialists, and at EU average for female ICT specialists.

Very high-capacity network coverage in rural areas and fibre coverage in general remain a key challenge for Germany. Despite recent significant improvements, Germany is still below the EU average in very high-capacity networks in rural areas (22.5% ([52]) compared to 37.1%). Fibre coverage and take-up, overall and in rural areas, are only picking up very slowly and remain considerably below EU average (15% overall and 11% rural compared to the EU average of 50% and 33.8%). It scores above the EU average in 5G coverage in 2021 (87% vs the EU average of 66%).

The country has a mixed performance in the integration of digital technology. Germany scores above the EU average for most indicators in this area, e.g. digital intensity for SMEs, and adoption of advanced digital technologies like big data or AI, except for cloud, which is slightly below the EU average. The performance of SMEs is close to the EU average for several indicators. The proportion of SMEs selling online is 19% (just above the EU average of 18%), their e-commerce turnover is 10% (just below the EU average of 12%) and the share of SMEs selling online cross-border is at 10% (slightly above the EU average of 9%). There are several initiatives in Germany that support SMEs in their digital transformation, such as the national SME strategy (*Mittelstandsstrategie*), the programme 'Mittelstand-Digital' (SMEs Digital) - which itself consists of the three pillars (i) the network 'Mittelstand Digital Innovation Hubs', (ii) the investment support scheme Digital Now (Digital Jetzt) and (iii) the 'Cybersecurity for SMEs Initiative', (*IT-Sicherheit-in-der-Wirtschaft*) - and the Digital Hub Initiative.

Germany is starting to improve its digital public services, but implementation is still slow. The country scores around the EU average for digital public services for businesses and for the general public. The National Regulatory Control Council acknowledges Germany's efforts on the digitalisation of public administration, but considers that the country is still lagging behind as regards quantifiable results ([53]).

([50]) 2030 Digital Compass: the European Way for the Digital Decade Communication, COM (2021) 118 final

([51]) The share of financial allocation contributing to digital objectives has been calculated using Annex VII of the RRF Regulation.

([52]) Key Indicators — Digital Scoreboard - Data & Indicators (digital-agenda-data.eu)

([53]) Source: National Regulatory Control Council: Monitor Digital Administration, Number 6

Table A8.1:**Key Digital Economy and Society Index indicators**

Human capital	Germany DESI 2020	Germany DESI 2021	Germany DESI 2022	EU DESI 2022	EU top-performance DESI 2022
At least basic digital skills	**NA**	**NA**	**49%**	**54%**	**79%**
% individuals			2021	2021	2021
ICT specialists	**4.0%**	**4.7%**	**4.9%**	**4.5%**	**8.0%**
% individuals in employment aged 15-74	2019	2020	2021	2021	2021
Female ICT specialists	**17%**	**18%**	**19%**	**19%**	**28%**
% ICT specialists	2019	2020	2021	2021	2021
Connectivity					
Fixed Very High Capacity Network (VHCN) coverage	**33%**	**56%**	**75%**	**70%**	**100%**
% households	2019	2020	2021	2021	2021
5G coverage(*)	**NA**	**18%**	**87%**	**66%**	**99.7%**
% populated areas		2020	2021	2021	2021
Integration of digital technology					
SMEs with at least a basic level of digital intensity	**NA**	**NA**	**59%**	**55%**	**86%**
% SMEs			2021	2021	2021
Big data	**15%**	**18%**	**18%**	**14%**	**31%**
% enterprises	2018	2020	2020	2020	2020
Cloud	**NA**	**NA**	**32%**	**34%**	**69%**
% enterprises			2021	2021	2021
Artificial Intelligence	**NA**	**NA**	**11%**	**8%**	**24%**
% enterprises			2021	2021	2021
Digital public services					
Digital public services for citizens	**NA**	**NA**	**76**	**75**	**100**
Score (0 to 100)			2021	2021	2021
Digital public services for businesses	**NA**	**NA**	**80**	**82**	**100**
Score (0 to 100)			2021	2021	2021

* The 5G coverage indicator does not measure users' experience, which may be affected by a variety of factors such as the type of device used, environmental conditions, number of concurrent users and network capacity. 5G coverage refers to the percentage of populated areas as reported by operators and national regulatory authorities.

Source: Digital Economy and Society Index

The Annex provides a general overview on the performance of the Germany's research and innovation system. Germany is a strong innovation performer according to the 2021 edition of the European Innovation Scoreboard ([54]), but its performance decreased relative to the EU average. Total R&D intensity reached 3.14% in 2020, placing Germany among the five EU member states reaching the European 3% goal by 2020. However, it is still below the target, set in 2018, of 3.5% for 2025 and reconfirmed in the coalition agreement of the new German government in 2021.

Germany invests considerable resources in R&D but innovation activity in SMEs continues to decline; innovation remains concentrated in fewer and mainly large businesses. Germany has one of the lowest percentages of business R&D expenditure performed by SMEs in the EU (0.19% in 2019, against 0.36% for the EU). The downward trend in SME's innovation activity was already apparent before the crisis. The proportion of innovators among SMEs has been on the decline for around 15 years. To improve this situation and to support the financing of research and innovation projects, the Federal Ministry for Economy and Climate Protection recently launched SME grants and favourable interest rates. The 2020 German Research Allowance Act provides a tax-free subsidy of 25% of salaries and wages for R&D purposes and a tax-free subsidy of 25 % of 60% of external research contracts up to a total limit of EUR 1 000 000 per business year.

Skills shortages are a major factor affecting the development of high-growth enterprises. Germany performs above the European average for the proportion of new graduates in science and engineering (19.7% in 2019 against 16.3% for the EU). However, the lack of qualified personnel is still the most significant factor hampering investment in innovation and digitalisation given Germany's strong focus on manufacturing. To overcome the shortage of skilled labour, the recovery and resilience plan envisages various measures that will contribute to upgrading skills and enhancing productivity.

([54]) 2021 European Innovation Scoreboard, Country profile: Germany https://ec.europa.eu/docsroom/documents/45915

Table A9.1:**Key research, development and innovation indicators**

Germany	2010	2015	2018	2019	2020	Compound annual growth 2010-20	EU average
Key indicators							
R&D Intensity (as % of GDP)	2.73	2.93	3.11	3.17	*3.14*	1.42	*2.32*
Public expenditure on R&D as % of GDP	0.90	0.92	0.97	0.98	*1.03*	1.36	*0.78*
Business enterprise expenditure on R&D performed by SMEs as % of GDP	:	0.17	0.17	0.19	:	-0.90	*0.36*
Quality of the R&I system							
Scientific publications of the country within the top 10% most cited publications worldwide as % of total publications of the country	11.2	11.3	10.5	:	:	-0.8	9.9
Patent Cooperation Treaty patent applications per billion GDP (in Purchasing Power Standards)	6.3	6.4	6.3	:	:	-1.8	3.5
Academia-business cooperation							
Public-private scientific co-publications as % of total publications	10.3	10.9	11.7	11.6	11.3	0.8	9.05
Human capital and skills availability							
New graduates in science & engineering per thousand pop. aged 25-34	15.1	17.1	16.2	19.7	:	3.8	16.3
Public support for business enterprise expenditure on R&D (BERD)							
Total public sector support for Business enterprise expenditure on R&D as % of GDP	:	*0.082*	:	*0.084*	:	-2.0	0.196
Green innovation							
Share of environment-related patents in total patent applications filed under Patent Cooperation Treaty (%)	16.6	13.8	13.6	:	:	-2.5	12.8
Finance for innovation and Economic renewal							
Venture Capital (market statistics) as % of GDP	3.2	2.6	4	4.9	5.5	5.3	5.4
Employment in fast-growing enterprises in 50% most innovative sectors	5.9	4.6	5.8	6.1	:	0.4	5.5

Source: Source: DG Research and Innovation - Common R&I Strategy and Foresight Service - Chief Economist Unit
Data: Eurostat, OECD, DG JRC, Science-Metrix (Scopus database and EPO's Patent Statistical database), Invest Europe

Productivity growth is a critical driver of economic prosperity, well-being and convergence over the long run ([55]). A major source of productivity for the EU economy is a well-functioning single market, where fair and effective competition and a business-friendly environment is ensured, in which small and medium-sized enterprises (SMEs) can operate and innovate without difficulty. Businesses and industry rely heavily on complex supply chains but are facing barriers that bear a negative impact on their productivity levels, employment, turnover and entry/exit rates. This may impact Germany's capacity to deliver on Europe's green and digital transformation.

The pandemic hit Germany's economy at a time of long-term declining labour productivity, but advances in digitalisation could give a positive impetus for productivity growth. The decline was driven mainly by the manufacturing sector, including the automotive industry, but also services productivity slowed. According to the German National Productivity Board, the main drivers of productivity growth in the future will be investment in education, research and innovation and framework conditions to set the right incentives for private investment. The pandemic has brought about advances in digitalisation that could boost productivity ([56]). However, while investment is increasing in software and databases, it still remains lower in Germany compared with other western Member States relative to the size of the economy. ([57]) Innovation expenditure is increasingly concentrated in large companies, whereas the contribution of SMEs to innovation activity is modest (see Annex 9). The lack of skills has become the main obstacle for investment in innovation and digitalisation, in particular for SMEs, and therefore hampers productivity growth, too. ([58])

Barriers to private and public investment and lack of competition, especially in the service sector, are obstacles to further growth. Public investment, especially at municipal level, is hampered by capacity and financing constraints, and by lengthy and complex planning and permit procedures. These also affect private investment, including in energy infrastructure and renewables deployment. Moreover, according to the Commission's 2021 updated restrictiveness indicator for regulated professions ([59]), regulatory barriers in business services and regulated professions remain high in international comparison, for example for architects, engineers, lawyers and tax counsels. Despite a related country-specific recommendation issued from 2011 to 2019, there has been very limited progress in this field.

The German economy has been significantly affected by global supply chain disruptions. Due to its strong integration in international value chains, German industry has been particularly affected by recent supply chain bottlenecks for raw materials and components, such as semi-conductors. In December 2021, almost 82% of companies in industry reported disruptions in supply chains, which held back production activity. ([60]). When global supply chains were starting to recover from the effects caused by the pandemic, Russia's invasion of Ukraine led to further disruptions in key sectors of German industry, including the automotive, metals and engineering, and the chemical sectors.

([55]) Annual Sustainable Growth Survey

([56]) German Council of Economic Experts, Productivity: Coronavirus crisis and structural change, 2021

([57]) JRC Country Factsheet on Productivity – Germany, European Commission, internal communication, 2022

([58]) DIHK-Fachkräftereport 2021, ZEW Innovationserhebung 2021, KfW SME Innovation Report 2021, IHK Digitalisierungsumfrage 2021

([59]) European Commission, COM (2021) 385, 2021

([60]) ifo Institut, 2022

Table A10.1:**Key Single Market and Industry Indicators**

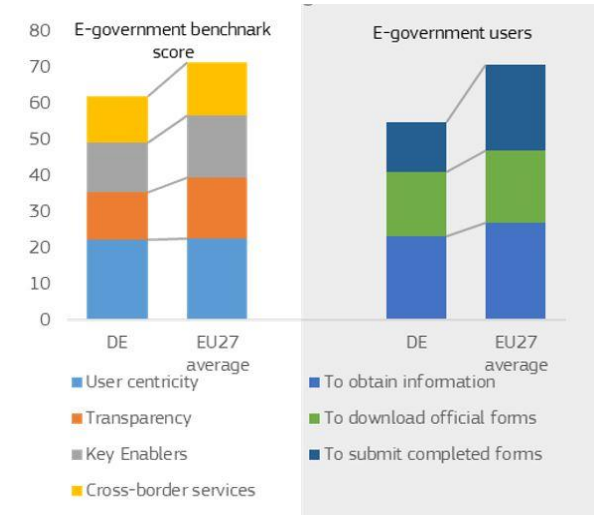
SUB-POLICY AREA	INDICATOR NAME	DESCRIPTION	2017	2018	2019	2020	2021	Growth rates	EU27 average*
HEADLINE INDICATORS									
Economic structure	Value added by source (domestic)	VA that depends on domestic intermediate inputs, % [source: OECD (TiVA), 2018]		73.71					**62.6%**
	Value added by source (EU)	VA imported from the rest of the EU, % [source: OECD (TiVA), 2018]		11.57					**19.7%**
	Value added by source (extra-EU)	% VA imported from the rest of the world, % [source: OECD (TiVA), 2018]		14.7					**17.6%**
Cost competitiveness	Producer energy price (industry)	Index (2015=100) [source: Eurostat, sts_inppd_a]	96.6	101.9	104	99.8	124.6	**29%**	**127.3**
RESILIENCE									
Shortages/supply chain disruptions	Material Shortage using survey data	Average (across sectors) of firms facing constraints, % [source: ECFIN CBS]	5	14	12	11	49	**880%**	**26%**
	Labour Shortage using survey data	Average (across sectors) of firms facing constraints, % [source: ECFIN CBS]	16	22	16	10	22	**38%**	**14%**
Strategic dependencies	Sectoral producer prices	Average (across sectors), 2021 compared to 2020 and 2019, index [source:Eurostat]						**5.3%**	**5.4%**
	Concentration in selected raw materials	Import concentration a basket of critical raw materials, index [source: COMEXT]	0.24	0.21	0.17	0.15	0.16	**-33%**	**17%**
	Installed renewables electricity capacity	Share of renewable electricity to total capacity, % [source:Eurostat, nrg_inf_epc]	53.5	52.8	54.6	56.9		**6%**	**47.8%**
Investment dynamics	Net Private investments	Change in private capital stock, net of depreciation, % GDP [source: Ameco]	2.6	2.8	2.9	2.1		**-19.2%**	**2.6%**
	Net Public investments	Change in public capital stock, net of depreciation, % GDP [source: Ameco]	0.04	0.1	0.1	0.2		**400%**	**0.4%**
SINGLE MARKET									
Single Market integration	Intra-EU trade	Ratio of Intra-EU trade to Extra-EU trade, index [source: Ameco]	1.30	1.34	1.34	1.35	1.40	**8%**	**2.00**
Professional services restrictiveness	Regulatory restrictiveness indicator	Restrictiveness of access to and exercise of regulated professions (professions with above median restrictiveness, out of the 7 professions analysed in SWD (2021)185 [source: SWD (2021)185; SWD(2016)436 final])	4				3	**-25%**	**3.37**
Professional qualifications recognition	Recognition decisions w/o compensation	Professionals qualified in another EU MS applying to host MS, % over total decisions taken by host MS [source: Regulated professions database]			32.1				**45%**
Compliance - cooperation EC and MS	Transposition - overall	5 sub-indicators, sum of scores [source: Single Market Scoreboard]	On average	On average	On average	Above average			
	Infringements - overall	4 sub-indicators, sum of scores [source: Single Market Scoreboard]	On average	Below average	Below average	Below average			
Investment protection	Confidence in investment protection	Companies confident that their investment is protected by the law and courts of MS if something goes wrong, % of all firms surveyed [source: Flash Eurobarometer 504]					69		**56%**
BUSINESS ENVIRONMENT - SMEs									
Business demography	Bankruptcies	Index (2015=100) [source: Eurostat, sts_rb_a]	n.a.	n.a.	n.a.	n.a.		**n.a.**	**70.1**
	Business registrations	Index (2015=100) [source: Eurostat, sts_rb_a]	n.a.	n.a.	n.a.	n.a.		**n.a.**	**105.6**
Access to finance	Late payments	Share of SMEs experiencing late payments in past 6 months, % [source: SAFE]	n.a.	n.a.	33.5	35	33.4	**-0.3%**	**45%**
	EIF Access to finance index - Loan	Composite: SME external financing over last 6 months, index from 0 to 1 (the higher the better) [source: EIF SME Access to Finance Index]	0.59	0.63	0.72	0.71		**20.4%**	**0.56**
	EIF Access to finance index - Equity	Composite: VC/GDP, IPO/GDP, SMEs using equity, index from 0 to 1 (the higher the better) [source: EIF SME Access to Finance Index]	0.4	0.4	0.3	0.2		**-50.6%**	**0.18**
	% of rejected or refused loans	SMEs whose bank loans' applications were refused or rejected, % [source: SAFE]	2.70	5.50	6.90	4.10	7.00	**165.2%**	**12.4%**
Public procurement	SME contractors	Contractors which are SMEs, % of total [source: Single Market Scoreboard]	44	45	49	57		**29.5%**	**63%**
	SME bids	Bids from SMEs, % of total [source: Single Market Scoreboard]	73	75	72	71		**-2.7%**	**70.8%**

*latest data

Source: See above in the table the respective source for each indicator in the column "description"

Good administrative capacity enables economic prosperity, social progress and fairness. Public administrations at all government levels deliver crisis response, ensure the provision of public services and contribute to building resilience for the sustainable development of the EU economy.

Graph A11.1: **E-government benchmark scores and e-government users**



Source: Eurostat (ICT use survey) and E-government benchmark report

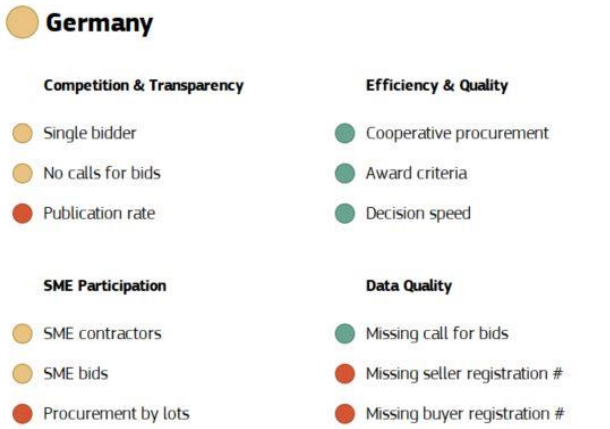
Overall, Germany's public administration is among the most effective in the EU27 ([61]). Germany has a developed regulatory system. It is relatively advanced in the promotion of open data, with the Federal Government having recently adopted an Open Data Strategy (2021 – 2026). Due to Germany's decentralised federal structure, many public administration responsibilities lie at the state (Länder) level. Public administration modernisation reforms therefore need thorough coordination and agreements across government levels.

Digitalisation of public administration remains an overarching reform topic. Germany scores below the EU average in terms of the proportion of e-government users and across the various dimensions of the e-government benchmark indicators (Graph A11.1). The new coalition agreement puts a strong focus on public administration modernisation and the German RRP aims to boost investment for digital transition of public administration.

([61]) Worldwide Governance Indicators, 2020.

Germany's civil service workforce is ageing more rapidly than most EU-countries. This is due to the lower attractiveness of civil service compared to the private sector in some fields and reflected in a decreasing proportion of younger employees ([62]). Within 10 years about a third of all federal, state and local government employees will retire. Gender inequality for senior civil service management positions is relatively high. Moreover, the participation rate of public administration employees in adult learning is below the EU-27 average.

Graph A11.2: **Public procurement performance**



(1) The competition and transparency indicators are triple-weighted, whereas the efficiency and quality indicators have unitary weights. All others receive a 1/3 weighting in the SMS composite indicator.
Source: Single market scoreboard 2020 data.

Germany's overall performance on public procurement is at the EU average. There is however, room for improvement given the relatively low level of procurement advertised on Tenders Electronic Daily (TED) and low scores in indicators measuring the quality of information in procurement (see Graph A11.2).

The justice system performs efficiently. The main challenge concerns administrative cases both as regards the time for concluding a case (426 days in the in the first instance in 2020) and the number of pending cases (0.9 per 100 inhabitants in 2020), though the clearance rate in this area has been high in recent years (110% in 2020). The overall quality of the justice system is good. Digital tools are widely used in courts,

([62]) European Commission, Directorate-General for Structural Reform Support, "Public administration and governance: Germany", Publications Office, 2022.

Table A11.1:**Public Administration indicators**

DE	Indicator (1)	2017	2018	2019	2020	2021	EU27
E-government							
1	Share of individuals who used internet within the last year to interact with public authorities (%)	59.0	61.0	63.0	69.0	55.0	70.7
2	2021 e-government benchmark´s overall score (2)	na	na	na	na	63.2	70.9
Open government and independent fiscal institutions							
3	2021 open data maturity index	na	na	na	na	89.0	81.1
4	Scope Index of Fiscal Institutions	52.0	52.0	52.0	52.0	na	56.8
Educational attainment level, adult learning, gender parity and ageing							
5	Share of public administration employees with tertiary education, levels 5-8	41.0	41.5	41.9	42.7	42.1	55.3
6	Participation rate of public administration employees in adult learning	12.6	12.4	12.6	12.0	11.9	18.6
7	Gender parity in senior civil service positions (3)	0.6	0.6	0.5	0.6	0.6	0.3
8	Share of public sector workers between 55 and 74 years	25.2	26.2	26.5	26.5	26.0	21.3
Public Financial Management							
9	Medium term budgetary framework index	0.48	0.63	0.63	0.63	na	0.72
10	Strength of fiscal rules index	1.4	1.5	1.5	1.5	na	1.5
11	Public procurement composite indicator	1.3	-1.3	-1.3	-0.7	na	-0.7
Evidence-based policy making							
12	Index of regulatory policy and governance practices in the areas of stakeholder engagement, Regulatory Impact Assessment (RIA) and ex post evaluation of legislation	2.31	na	na	2.27	na	1.7

(1) High values stand for good performance barring indicators # 7 and 8.
(2) Measures the user centricity (including for cross-border services) and transparency of digital public services as well as the existence of key enablers for the provision of those services.
(3) Defined as the absolute value of the difference between the share of men and women in senior civil service positions.
(4) Breaks in the series: indicator 1: 2018; indicators #5, 6 and 8: 2020 and 2021
Source: ICT use survey, Eurostat (# 1); E-government benchmark report (# 2); Open data maturity report (# 3); Fiscal Governance Database (# 4, 9, 10); Labour Force Survey, Eurostat (# 5, 6, 8), European Institute for Gender Equality (# 7), Single Market Scoreboard public procurement composite indicator (# 11); OECD Indicators of Regulatory Policy and Governance (# 12).

including an electronic case management system, technology for secure remote work by judges and staff, means of distance communication, and an electronic case allocation system. As regards judicial independence, no systemic deficiencies have been reported. ([63])

([63]) For more detailed analysis of the performance of the justice system in Germany, see the 2022 EU Justice Scoreboard (forthcoming) and the country chapter for Germany of the Commission's 2022 Rule of Law Report (forthcoming).

ANNEX 12: EMPLOYMENT, SKILLS AND SOCIAL POLICY CHALLENGES IN LIGHT OF THE EUROPEAN PILLAR OF SOCIAL RIGHTS

The European Pillar of Social Rights provides the compass for upward convergence towards better working and living conditions in the EU. The implementation of its 20 principles on equal opportunities and access to the labour market, fair working conditions, social protection and inclusion, supported by the 2030 EU headline targets on employment, skills and poverty reduction, will strengthen the EU's drive towards a digital, green and fair transition. This annex provides an overview of Germany's progress in achieving the goals under the European Pillar of Social Rights.

Table A12.1: **Social Scoreboard**

Social Scoreboard for GERMANY		
Equal opportunities and access to the labour market	Early leavers from education and training (% of population aged 18-24) (2021)	11.8
	Individuals' level of digital skills (% of population 16-74) (2021)	49.0
	Youth NEET (% of total population aged 15-29) (2021)	9.2
	Gender employment gap (percentage points) (2021)	7.3
	Income quintile ratio (S80/S20) (2020)	6.5
Dynamic labour markets and fair working conditions	Employment rate (% population aged 20-64) (2021)	79.6
	Unemployment rate (% population aged 15-74) (2021)	3.6
	Long term unemployment (% population aged 15-74) (2021)	1.2
	GDHI per capita growth (2008=100) (2020)	113.2
Social protection and inclusion	At risk of poverty or social exclusion (in %) (2020)	22.5
	At risk of poverty or social exclusion for children (in %) (2020)	25.1
	Impact of social transfers (other than pensions) on poverty reduction (% reduction of AROP) (2020)	31.5
	Disability employment gap (ratio) (2020)	32.4
	Housing cost overburden (% of population) (2020)	19.9
	Children aged less than 3 years in formal childcare (% of under 3-years-olds) (2020)	16.4
	Self-reported unmet need for medical care (% of population 16+) (2020)	0.1
Critical situation / To watch / Weak but improving / Good but to monitor / On average / Better than average / Best performers		

Note: Update of 29 April 2022. Members States are classified on the Social Scoreboard according to a statistical methodology agreed with the EMCO and SPC Committees. It looks jointly at levels and changes of the indicators in comparison with the respective EU averages and classifies Member States in seven categories. For methodological details, please consult the Joint Employment Report 2022. Due to changes in the definition of the individuals' level of digital skills in 2021, exceptionally only levels are used in the assessment of this indicator; NEET: neither in employment nor in education and training; GDHI: gross disposable household income.

Source: Eurostat.

While the labour market is recovering, the participation of some underrepresented groups remains a challenge. Germany has one of the highest employment rates for women in the EU (75.9% vs an EU average of 67.7% in 2021), with a gender employment gap of 7.3 pps (against an EU average of 10.8 pps). However, female part-time employment remains high with a wide gender pay gap (also reflecting the lower number of hours worked). High taxes on labour and a specific tax regulation for married couples (*Ehegattensplitting*), and an insufficient provision of high quality childcare and all-day school facilities, remain key factors behind the lower labour market participation of women. In particular, children with a migrant background are highly underrepresented in early childhood education and care. The investment in 90 000 additional childcare places as part of the recovery and resilience plan (RRP) will contribute to addressing this challenge.

Strengthening the provision of upskilling and reskilling is key for addressing persistent skills shortages. In 2020, 14.8% of Germans aged 20-64 had low qualifications and their employment rate, at 60.4%, was 19.2 pps lower than the overall employment rate (against an EU average difference of 17 pps). Pre-existing shortages of skilled labour remained in place during the COVID-19 pandemic. Population ageing as well as the digital and green transitions are expected to further reinforce these shortages. Moreover, the employment gap of people with disabilities (at 32.4 pps) widened in Germany in 2020. EU cohesion policy funds will support measures to strengthen the provision of upskilling and reskilling given their key role in matching the need of the labour market, contributing to addressing labour shortages and skills gaps. Tackling these challenges is key for Germany to contribute to reaching the 2030 EU headline target on employment.

Socio-economic and migrant backgrounds still strongly influence educational outcomes. The incidence of early school leaving and training interruption increased slightly and is now above the EU average (11.8% vs 9.7% in the EU). However, for the non-EU born the rate is 26%.

Adult participation in learning ([64]) remained stable in the last ten years and slightly below the EU average (7.7% vs 10.8% in the EU in 2021), however, only 3.7% for the low qualified (yet higher than the EU average). Germany performs with 49% below the EU average of 54% on basic digital skills of individuals aged 16-74 in 2021. Investment in skills is key to achieving the EU headline target on adult learning.

Social indicators point to a number of challenges in Germany. Most recent data suggest a deterioration in some social indicators, but this needs to be interpreted with caution as this might reflect a change in statistical methodology ([65]). In 2020, the at-risk-of-poverty or social exclusion rate increased from 21.4% to 22.5%, above the EU average of 21.9%. In particular, children are affected by poverty and social exclusion risks, with a share above the EU average. The share of persons with disabilities at risk of poverty or social exclusion was (at 31.5%) higher than the EU average (28.4%). To address these challenges, Germany is allocating a considerable share of European Social Fund Plus (ESF+) funding to programmes aimed at fostering social inclusion. Income inequality, measured by the ratio of total income received by the 20 % of the population with the highest income (top quintile) to that received by the lowest quintile, is one of the highest in the EU and over 1 pp higher than the EU average. The housing cost overburden rate (i.e. the percentage of people living in households with housing costs above 40% of total income) is above the EU average, highlighting the importance of providing affordable housing. Overall, there is scope for reinforced social policy action in order for Germany to contribute to lifting people out of poverty and in this way reaching the 2030 EU headline target on poverty reduction.

([64]) The indicator on adult learning participation over the previous four weeks is used in the country report, rather than the indicator on learning over the previous 12 months, as Adult Education Survey (AES) data for the 12-month indicator are only available for 2016 at the moment, while the new Labour Force Survey (LFS) indicator agreed for use in the social scoreboard and as 2030 headline target on skills will only be available in 2023

([65]) From 2020 on, Germany transmits data on the AROPE indicator and its sub-indicators to the EU-SILC from a different survey (the 'Mikrozensus'). To ensure comparability between 2019 and 2020, Eurostat published revised 2019 AROPE and AROP values for Germany, on which the current analysis relies.

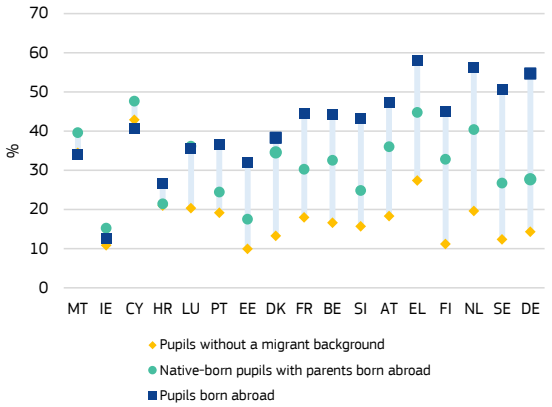
This annex outlines the main challenges for Germany's education and training system in light of the EU-level targets of the European Education Area strategic framework and other contextual indicators, based on the analysis from the 2021 Education and Training Monitor. Germany's education and training system struggles with equity challenges that could worsen due to the pandemic. Germany lags behind the EU average and EU-level targets in terms of participation in early childhood education and care as well as in tertiary education. Germany still misses the EU-level targets in basic skills and for early leavers from education and training.

Participation rates in early childhood education and care have decreased. Germany is increasing places in early childhood education and care, however demand is rising faster. Therefore further investment is needed.

Basic skill levels have deteriorated over time and socio-economic and migrant background strongly affect education outcomes. Between 2015 and 2018, the proportion of underachieving pupils, as measured by PISA, increased for all tested subjects. Especially socioeconomically disadvantaged and migrant students are more affected. The gap in the share of low-achievers among native born and foreign-born pupils is the largest in the EU, corresponding to 2 years of schooling. However, the gap is significantly lower for second-generation migrant pupils. Low- and high-performing students cluster in certain schools more often than on average in the OECD. Learning losses that are expected due to the pandemic risk further aggravating the situation. The percentage of early leavers from education and training among young people born abroad is three times higher than that of native-born young people (25.5% vs 8.5%).

The ageing of teaching staff and emerging teacher shortages risk affecting both the quality and equity of education ([66]). Germany's teachers are older than the EU average, while the demand for teachers is increasing because of a growing school population and the expansion of all-day schools. Some 13% of the 36 000 newly recruited teachers in 2018 had not completed initial teacher training (51% in Saxony, 40% in Berlin and one quarter in several other regions). Apart from regional differences, not all types of schools and subjects are affected by staff shortages the same way. Teachers without completed initial teacher training are frequently allocated to schools or classes with pupils from disadvantaged backgrounds, which can exacerbate the equity problem. Teachers also need more training on ICT in education, where Germany lags behind but is planning sizeable investments.

Graph A13.1: **Low achievement in reading by migrant background, PISA 2018**



Source: OECD (2019), PISA 2018. Note: The EU average does not include Spain. Member States with a share of migrant pupils lower than 5% are not shown in the chart.

Tertiary education attainment is increasing, but is still lower than the EU average adding to a skills gap. The urban-rural gap is significant and has widened. The share of non-EU-born students is close to that of native students (-1.8 pps) the gap being smaller than the EU average. In 2020, tertiary attainment is 3.8 pps higher for EU-born young people aged 25-34 than for native-born (35.1%), reflecting the capacity to attract talent from abroad.

The reforms and investment measures under the recovery and resilience plan contribute to addressing some of these long-standing challenges. Key support focuses on digitalisation in education, increasing places in early childhood education and care and in providing for some COVID-19 related support to students.

([66]) Autorengruppe Bildungsberichterstattung, 2020; National Report on Education in Germany; OECD Education Policy Outlook 2020; Education and Training Monitor Germany 2021

Table A13.1:**EU-level targets and other contextual indicators under the European Education Area strategic framework**

				2015		2021	
Indicator			**Target**	**Germany**	**EU27**	**Germany**	**EU27**
Participation in early childhood education (age 3+)			**96%**	**96.0%**	**91.9%**	**94.0%** [2019]	**92.8%** [2019]
Low achieving 15-year-olds in:		**Reading**	**< 15%**	**16.2%**	**20.4%**	**20.7%** [2018]	**22.5%** [2018]
		Mathematics	**< 15%**	**17.2%**	**22.2%**	**21.1%** [2018]	**22.9%** [2018]
		Science	**< 15%**	**17.0%**	**21.1%**	**19.6%** [2018]	**22.3%** [2018]
Early leavers from education and training (age 18-24)	**Total**		**< 9 %**	**10.1%**	**11.0%**	**11.8%**	**9.7%**
	By gender	*Men*		10.4%	12.5%	13.5%	11.4%
		Women		9.8%	9.4%	9.9%	7.9%
	By degree of urbanisation	*Cities*		10.3%	9.6%	11.8%	8.7%
		Rural areas		8.3%	12.2%	9.4%	10.0%
	By country of birth	*Native*		8.6%	10.0%	9.2%	8.5%
		EU-born		:	20.7%	31.6%	21.4%
		Non EU-born		:	23.4%	27.6%	21.6%
Tertiary educational attainment (age 25-34)	**Total**		**45%**	**29.6%**	**36.5%**	**35.7%**	**41.2%**
	By gender	*Men*		28.6%	31.2%	33.9%	35.7%
		Women		30.6%	41.8%	37.7%	46.8%
	By degree of urbanisation	*Cities*		37.5%	46.2%	43.0%	51.4%
		Rural areas		21.7%	26.9%	28.4%	29.6%
	By country of birth	*Native*		29.9%	37.7%	36.2%	42.1%
		EU-born		:	32.7%	36.5%	40.7%
		Non EU-born		:	27.0%	33.5%	34.7%
Share of school teachers (ISCED 1-3) who are 50 years or over				44.6%	38.3%	40.1% [2019]	38.9% [2019]

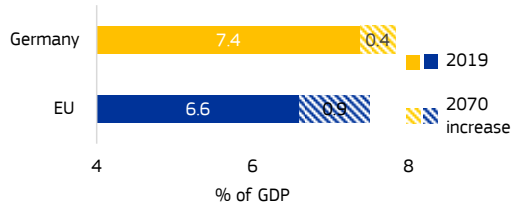
(1) The 2018 EU average on PISA reading performance does not include ES; b = break in time series, p = provisional, : = not available; Data are not yet available for the remaining EU-level targets under the European Education Area strategic framework, covering underachievement in digital skills, exposure of vocational education and training graduates to work based learning and participation of adults in learning.

Source: Eurostat (UOE, LFS); OECD (PISA)

Especially relevant in light of the ongoing COVID-19 pandemic, resilient healthcare is a prerequisite for a sustainable economy and society. This Annex provides a snapshot of the healthcare sector in Germany.

Life expectancy in Germany was at the same level as the EU average, but fell in 2020 by more than 2 months due to COVID-19. As of 17 April 2022, 1.60 cumulative COVID-19 deaths and 282 confirmed cumulative COVID-19 cases per 1 000 inhabitants were reported. Germany fares comparatively well in avoiding deaths from treatable causes, also reflected in low cancer mortality.

Graph A14.1: **Projected increase in public expenditure on health care over 2019-2070 (reference scenario)**



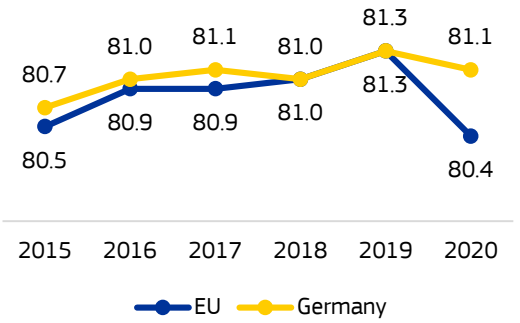
Source: European Commission/EPC (2021)

Health spending relative to GDP in Germany was the highest in the EU in 2019. Most health spending comes from public sources; out-of-pocket payments amount to only 12.7 %, which is well below most other EU countries. Public expenditure on health is projected to increase by 0.4 pps of GDP by 2070 (compared to 0.9 pps for the EU).

Germany has the highest number of hospital beds per population in the EU and the number of health staff is well above the EU average. Access to health services is very good and self-reported unmet needs for medical care are close to zero. However, a comparatively strong separation between ambulatory and hospital care and a lack of effective coordination between primary and specialist ambulatory care have led to problems with continuity and coordination.

Through its recovery and resilience plan, Germany plans to invest EUR 4.4 billion (17.3 % of the total RRP) in healthcare. Investments focus on the digital transition of the health system (IT-related investments in hospitals and public health service, including the related construction and refurbishment of buildings).

Graph A14.2: **Life expectancy at birth in years**



Source: Eurostat database

Table A14.1:**Key health indicators**

	2016	2017	2018	2019	2020	EU average (latest year)
Treatable mortality per 100 000 population (mortality avoidable through optimal quality healthcare)	86.9	85.5	85.3	81.7		92.1 (2017)
Cancer mortality per 100 000 population	253.2	246.6	245.9	243.7		252.5 (2017)
Current expenditure on health, % GDP	11.2	11.3	11.5	11.7		9.9 (2019)
Public share of health expenditure, % of current health expenditure	84.3	84.5	84.5	84.6		79.5 (2018)
Spending on prevention, % of current health expenditure	3.3	3.2	3.3	3.3		2.8 (2018)
Acute care beds per 100 000 population	605.6	601.5	600.9	594.9		387.4 (2019)
Doctors per 1 000 population *	4.2	4.2	4.3	4.4		3.8 (2018)
Nurses per 1 000 population *	12.8	13.1	13.8	13.9		8.2 (2018)
Consumption of antibacterials for systemic use in the community, daily defined dose per 1 000 inhabitants per day **	12.8	12.6	11.7	11.4	9.0	14.5 (2020)

Source: Eurostat; except: * Eurostat and OECD, ** ECDC. Notes: Doctors' density data refer to practising doctors in all countries except FI, EL, PT (licensed to pratice) and SK (professionally active). Nurses' density data refer to practising nurses in all countries (imputation from year 2014 for FI) except IE, FR, PT, SK (professionally active) and EL (nurses working in hospitals only). More information: https://ec.europa.eu/health/state-health-eu/country-health-profiles_en

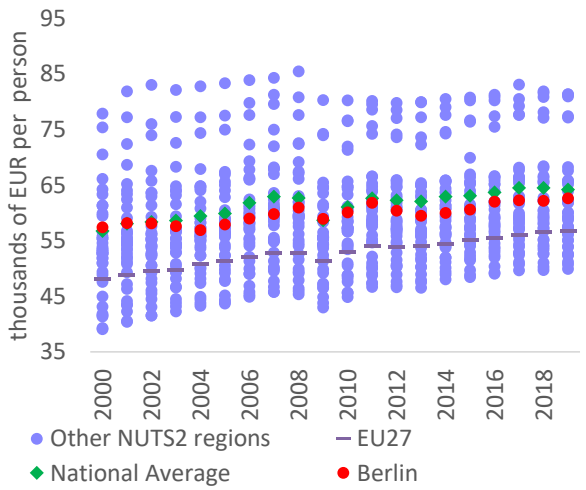
The regional dimension is an important factor when assessing economic and social developments in Member States. Taking into account this dimension enables a well-calibrated and targeted policy response that fosters cohesion and ensures sustainable and resilient economic development across all regions.

However, the gap between regions remains high. In 2019, Hamburg's GDP per inhabitant (in purchasing power standard (PPS)) corresponded to 195% of the EU average, while the runner-ups (Upper Bavaria, Stuttgart and Darmstadt) achieved between 173% and 154%. The remaining regions were further behind, and GDP per head bottomed out at 84% in the three least developed ([67]) regions of Mecklenburg-Western Pomerania, Saxony-Anhalt and Lüneburg. Germany's east-west economic divide, while significantly less pronounced than in the years after unification, is still obvious: in 2019, GDP per capita (in PPS in eastern German regions including Berlin was 74.8% of their western counterparts.

Convergence with the EU per capita GDP average was relatively slow between 2010 and 2019 and uneven across different regions (Graph A15.1). Among less developed regions, only in Thuringia, Leipzig, Chemnitz, Dresden (eastern regions) and Koblenz growth of GDP per inhabitant was higher than in Germany overall (1.6%), enabling them to catch up with the EU GDP average. More commonly, growth was just at EU average (e.g. in the eastern regions of Mecklenburg-Western Pomerania and Saxony-Anhalt) or lower (e.g. 1.2% - 1.0% in Trier, Schleswig-Holstein and Münster), impeding their economic convergence. A more mixed picture emerges for the most developed regions, as some have been driving growth in Germany (e.g. Braunschweig and Stuttgart with at least 2.5%), while the growth of others was well below the EU average (e.g. Hamburg, Darmstadt and Bremen with < 1%). Overall, most western German regions grew slower than the EU average, and most southern ones and Berlin faster.

Labour productivity gaps between the more and the less developed regions mirror disparities in GDP per capita. German labour productivity, measured as gross value added per person employed, stands at 106% of the EU average in PPS terms. It ranged from 134% in Upper Bavaria, Braunschweig and Hamburg to just 84%-85% in neighbouring Mecklenburg-Western Pomerania and Thuringia, and 82% in Chemnitz.

Graph A15.1: **Gross value added per worker**



Source: European Commission

Similar to economic output, productivity has been slowly converging overall. However, significant challenges remain: while between 2010 and 2019, Thuringia, one of the less developed German regions, saw the third-highest average annual productivity increase (1.76%), several of the more developed regions also experienced high increases (e.g. Braunschweig, Stuttgart, Tübingen). In addition, productivity growth was below the German average of 0.9% in many lagging regions, such as Lüneburg, Schleswig-Holstein and Münster.

The transition to a carbon-neutral economy has a differentiated effect on regions and coal-mining regions are especially hard hit. Closing the remaining lignite mining for electricity production has the potential for a fast and significant reduction of CO2 emissions. However, this change puts significant socio-economic pressure on the three mining areas in Brandenburg, Saxony, Saxony-Anhalt and in North Rhine Westphalia. To facilitate the transition, the Just Transition Fund will concentrate its resources on these areas.

([67]) The terms 'Less/least developed', 'more/most developed' refer to regions compared with other regions in this country. These terms should not be confused with the classification for fund eligibility criteria.

Table A15.1: **Regional data on economic and social performance**

NUTS 1 Region	GDP per head (PPS)	Productivity (GVA (PPS) per person employed)	GDP per head growth	Population growth	Unemp-loyment rate	R&D expendi-ture	Gross Fixed Capital Formation	Innovation performance
	EU27=100, 2019	EU27=100, 2018	Avg % change on preceding year, 2010-2019	Total % change, 2011-2019	% of active population, 2020	% of GDP, 2019	% of GDP, 2018	RIS regional performance group
European Union	100	100	1.39	1.8	7.1	2.23	22.02	
Germany	120	106	1.60	3.7	3.8	3.17	21.13	
Baden-Württemberg	137	115	2.04	5.9	3.2	5.74	23.04	Leader innovator
Bayern	141	115	1.94	6.0	2.6	3.39	24.47	Mostly strong innovator
Berlin	123	103	1.74	11.8	6.3	3.33	19.39	Leader innovator
Brandenburg	86	92	1.49	2.4	4.5	1.80	24.66	Moderate innovator
Bremen	144	108	1.00	4.6	5.8	2.99	16.17	Strong innovator
Hamburg	195	134	0.70	8.3	4.9	2.17	17.97	Leader innovator
Hessen	137	117	1.06	5.3	3.9	3.08	18.67	Moderate - strong - leader
Mecklenburg-Vorpommern	84	84	1.40	-0.4	4.2	1.80	25.28	Moderate innovator
Niedersachsen	112	103	1.91	2.7	3.9	3.11	24.96	Moderate - strong - leader
Nordrhein-Westfalen	116	104	1.16	2.3	4.2	2.15	16.82	mostly strong innovator
Rheinland-Pfalz	103	101	1.41	2.5	3.7	2.60	23.03	Moderate - strong - leader
Saarland	107	95	1.09	-1.5	4.0	1.89	17.59	Strong innovator
Sachsen	92	86	1.83	0.1	4.0	2.97	20.59	Strong innovator
Sachsen-Anhalt	84	88	1.42	-4.5	4.6	1.53	18.86	Moderate innovator
Schleswig-Holstein	98	95	1.24	3.7	3.3	1.67	21.36	Strong innovator
Thüringen	87	85	2.11	-2.8	3.5	2.33	20.05	Strong innovator

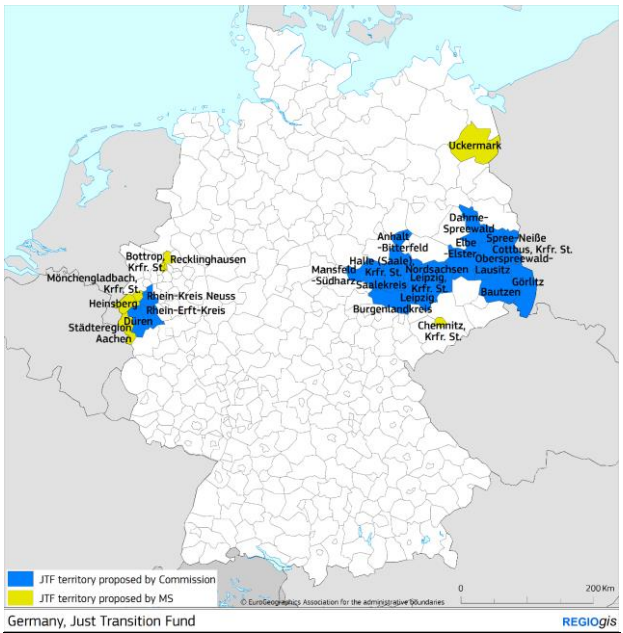
Source: Eurostat, European Innovation Scoreboard

Expenditure on R&D is unevenly distributed and associated with the presence of large enterprises. It was especially high in Braunschweig (7.8% of GDP in 2019, thanks to Volkswagen's headquarters in that region) and Stuttgart (7.3%), and was higher than the German average of 3.2% in many southern regions. It was low (less than 2% of GDP) in many eastern and western regions, with less than 1% in Lüneburg, Trier and Koblenz.

Gross fixed capital formation, unlike R&D expenditure, is just below the EU average, but similarly affected by regional disparities. More than 10 pps (GFCF in % of GDP, 2018) lie between the regions with the lowest investment (such as Düsseldorf, Bremen and Arnsberg) and those at the top of the regional distribution in Germany (such as Upper Bavaria, Lüneburg and Trier).

Some labour market disparities remained in 2020. The employment rate reached 85% in Upper Franconia and Swabia and was almost as high in several southern regions, while it bottomed out at around 70-75% in the western regions of Bremen and Giessen. The unemployment rate decreased to 2.2-2.3% in in Lower Bavaria and Upper Palatinate and peaked at 5.8-6.3% in the regions of Bremen and Berlin.

Graph A15.2: **Territories most affected by climate transition in Germany**



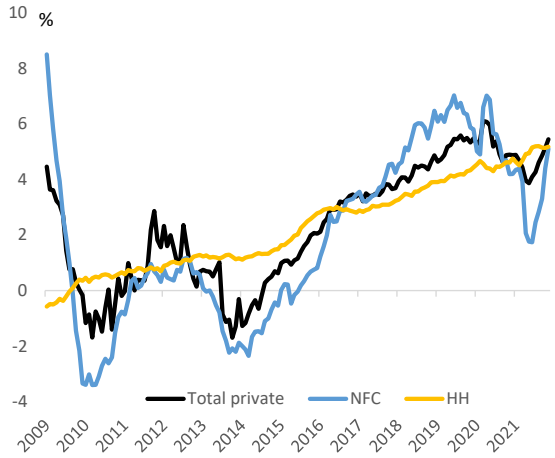
Source: European Commission

ANNEX 16: KEY FINANCIAL SECTOR DEVELOPMENTS

This Annex provides an overview of key developments in Germany's financial sector. German banks remain well capitalised and credit risks appear low compared with EU averages, but profitability remains disappointing. Bank balance sheets appear remarkably sound with a non-performing ratio of 1.1%, which is among the lowest in the EU. In 2021, German banks made some progress in improving their historically lagging profitability. Return on equity improved to 5.0% in 2021 from 2.2% in 2020, albeit still far below the EU average of 7.1%. German banks keep on struggling with poor cost efficiency and the consequences of insufficient past investments in digitalisation. The cost-to-income ratio remains high, but improved to 66.6% in 2021 from 70.7% in 2020, compared with EU averages of 60.4% and 63.7%, respectively.

Risks to financial stability, in particular in the housing market, have intensified during the pandemic. While growth in credit to non-financial corporations slowed down during the pandemic, credit to households remained buoyant and its growth accelerated to 5.1% in November 2021. Lending for house purchases expanded even more briskly by 8.2% in 2021, while house price growth accelerated to 12.9% year on year in the third quarter of 2021, raising concerns on housing market pressures. The European Systemic Risk Board (ESRB) responded by making Germany one of two EU Member States to which it addressed specific recommendations in 2022, attesting that overvaluations were 'high and increasing'. The ESRB advocated the activation of legally binding loan-to-value limits and the introduction of loan-to-income limits.

Graph A16.1: **Credit growth**



Source: European Commission
Note. NFC signifies non-financial corporations, HH signifies households

The national regulator BaFin took some first steps to address such risks by introducing a 2% systemic risk buffer on residential real estate loans, and increasing the countercyclical capital buffer from 0.0% to 0.75% as of early 2022. While leverage also rose in the non-financial corporate sector, the sector's debt ratio remains far below the euro-area average.

The collapse of Wirecard and Greensill exposed limitations in the capabilities and independence of the German banking and market supervisors. Some of these were expressed by the Financial Stability Board in its Peer Review of Germany in 2020. The German government has introduced legislation and launched an organisational reform that address some of the identified issues.

Table A16.1:**Key financial soundness indicators**

	2017	2018	2019	2020	2021
Total assets of the banking sector (% of GDP)	236.0	230.9	239.3	265.6	258.5
Share (total assets) of the five largest bank (%)	29.7	29.1	31.2	34.0	-
Share (total assets) of domestic credit institutions (%)[1]	93.1	89.0	87.1	83.7	81.6
Financial soundness indicators:[1]					
- non-performing loans (% of total loans)	1.8	1.4	1.2	1.2	1.1
- capital adequacy ratio (%)	18.8	18.4	18.1	18.8	18.5
- return on equity (%)	2.9	2.4	2.1	2.2	5.0
NFC credit growth (year-on-year % change)	4.2	6.5	5.8	4.2	6.1
HH credit growth (year-on-year % change)	3.2	3.9	4.4	4.8	5.1
Cost-to-income ratio (%)[1]	74.0	76.8	75.5	70.7	66.6
Loan-to-deposit ratio (%)[1]	89.4	90.2	87.7	80.8	79.2
Central bank liquidity as % of liabilities	1.6	1.4	1.2	4.7	5.7
Private sector debt (% of GDP)	106.6	107.7	110.7	120.1	-
Long-term interest rate spread versus Bund (basis points)	0.0	0.0	0.0	0.0	0.0
Market funding ratio (%)	54.1	53.6	52.0	50.7	-
Green bond issuance (bn EUR)	7.1	5.7	20.0	38.3	63.0

[1] *Last data: Q3 2021.*

Source: ECB, Eurostat, Refinitiv.

The Macroeconomic Imbalance Procedure matrix presents the main elements of the in-depth review undertaken for Germany in accordance with Article 5 of Regulation (EU) No 1176/2011 on the prevention and correction of macroeconomic imbalances as summarised in the Staff Working Document (SWD (2022)629 final) ([68]).

Germany continues to run a persistent large current account surplus, reflecting among others a subdued level of investment relative to savings. Existing administrative planning and implementation barriers, constrain public and private investment. Income and wealth inequality limit consumption growth and result in an elevated household saving rate. The persistent excess of savings over investment indicates an underuse of resources.

The current account surplus will likely remain elevated. Corporate investment has remained somewhat below the pre-pandemic level and corporations have continued to post strong net savings. Residential investment has increased but supply still falls short of housing demand. The current account surplus increased slightly in 2021 to 7.4% of GDP and is forecast to decline somewhat in 2022 to 6.4% of GDP on account of high commodity prices and trade disruption. It is forecast to rebound to 6.8 % of GDP by 2023, remaining above the level indicated by fundamentals.

There are promising policy announcements, still further efforts and thorough implementation are key for addressing investment needs. While there are government plans to increase investment and tackle investment bottlenecks, the resources so far allocated may nonetheless not cover all large investment needs. Increasing ambition along with a timely and targeted implementation of the planned investments would help to increase the overall investment level. This would be further supported by tackling the investment bottlenecks as also envisaged in the Recovery and Resilience Plan and the coalition agreement. The minimum wage increase may help to reduce wage inequalities and foster domestic demand. Still, its impact is likely to be moderated by the ongoing deterioration in purchasing power and consumer confidence.

For those reasons, and more generally on the basis of the elements of the in-depth review undertaken for Germany under Regulation (EU) No 1176/2011 on the prevention and correction of macroeconomic imbalances as summarised in the Staff Working Document (SWD (2022)629 final), **the Commission has considered in its Communication "European Semester – 2022 Spring Package" (COM(2022)600 final) that Germany continues to experience macroeconomic imbalances**.

([68]) European Commission (2022), COMMISSION STAFF WORKING DOCUMENT In-Depth Review for Germany in accordance with Article 5 of Regulation (EU) No 1176/2011 on the prevention and correction of macroeconomic imbalances.

Table A17.1:**Assessment of Macroeconomic Imbalances matrix**

	Gravity of the challenge	Evolution and prospects	Policy response
Imbalances (unsustainable trends, vulnerabilities and associated risks)			
External balance	Germany has a persistently large current account surplus, considerably above what fundamentals suggest. Germany's demographics and high manufacturing intensity imply a much smaller surplus of somewhat above 2% of GDP. The surplus reflects a substantial shortfall in domestic demand, notably due to relatively low investment. The under-investment impedes capital deepening and potential growth, and has considerable spillovers on EU partners.	In 2021, the current account surplus increased slightly to 7.4% of GDP. This reflects the elevated net household saving rate, as the pandemic and supply shortages constrained consumption possibilities. The fiscal deficit again turned out smaller than forecast at 3.7% of GDP reflecting the operation of automatic stabilisers and incomplete uptake of funds committed to pandemic response. Overall investment remained somewhat below the pre-pandemic level as supply bottlenecks constrained equipment investment and public non-residential construction. Corporations continued to post strong net savings. Residential investment increased compared to 2019, yet supply still falls short of housing demand and remains below completion ratios in neighbouring economies. Going forward, the current account surplus is expected to decline in 2022 on account of record commodity prices and trade disruptions, rebound somewhat in 2023 and continue its moderate decline when commodities prices normalise in the future. The current account balance remains linked to subdued private and public investment, which are constrained by various bottlenecks to investment.	Germany has taken some policy steps to address its imbalances. Real public investment increased by about 4% per year. on average over 2015-2020. In 2021, it increased by 1% in nominal terms, but declined by 3.7% in volume, due to surging construction costs and supply shortages. At 2.5%, the public investment ratio was marginally lower in 2021 than in 2020 (2.6%) but remained above its pre-pandemic level of 2.4% in 2019. Overall, the fiscal deficits in 2020 and 2021 helped shore up private sector balances and contain the decline in aggregate demand, which in turn helped to cushion euro-area domestic demand and GDP. Nevertheless, the overall current account surplus was not materially affected. There are government plans to increase investment and tackle investment bottlenecks, while the resources so far allocated may have relatively limited impact on the current account surplus. Going forward, the minimum wage increase is set to foster the living standards of low income earners, and thus assist consumption, absent employment losses. In contrast, wage growth for the average employee is forecast to remain muted with respect to inflation and euro area peers, thus sustaining the demand shortfall.

Source: European Commission

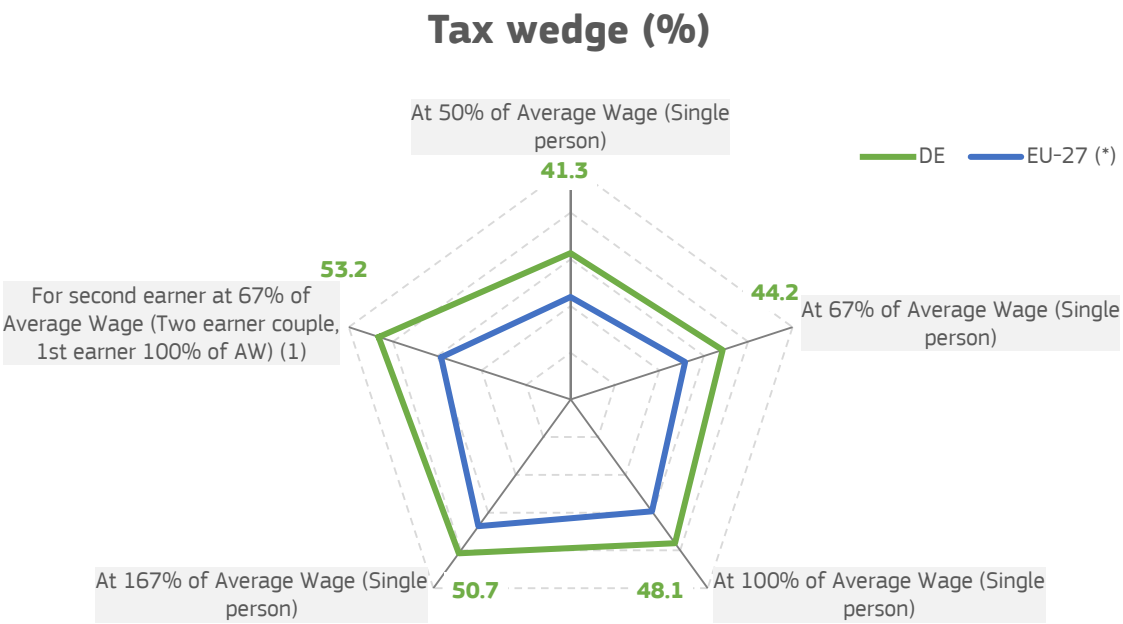
This Annex provides an indicator-based overview of Germany's tax system. It includes information on the tax structure, i.e. the types of tax that Germany derives most revenue from, the tax burden for workers, and the progressivity and redistributive effect of the tax system. It also provides information on tax collection and compliance and on the risks of aggressive tax planning activity.

Germany's tax revenues are relatively high in relation to the country's GDP, and the tax system relies heavily on labour taxation while only to a low extent on relatively growth-friendly tax bases. Reductions in the labour tax burden, especially of low-income earners, and a greater use of environmental and recurrent property taxes can help support inclusive and sustainable economic growth. In 2020, German labour tax revenues as a percentage of GDP were among the highest in the EU, while revenues from consumption taxes and from environmental taxes as a percentage of GDP were among the lowest. Revenues from recurrent taxes on property were also low compared with the EU aggregate.

Germany's labour tax burden is high across all income levels. The labour tax wedge for Germany in 2021 was substantially higher than the EU average at various income levels, i.e. for single people at the average wage (100%) as well as at 50%, 67% and 167% of the average wage. Second earners at a wage level of 67% of the average wage, whose spouse earns the average wage, also faced one of the highest tax wedges in the EU. Moreover, the difference between their tax wedge and the one of single persons at the same wage level was among the highest in the EU. The tax-benefit system helped reduce inequality, as measured by the Gini coefficient, by slightly less than the EU average in 2019.

Germany is doing moderately well on digitalisation efforts in tax administration, which can also help reduce tax arrears and cut compliance costs. Outstanding tax arrears have remained low at 1.1% of total net revenue. This is significantly below the EU27 average of 31.8%, although that average is inflated by very large values in a few Member States (EU median value in 2019 was 12.5%). The Annual Report on Taxation 2021 highlights scope for improvement in the rate of tax return e-filing especially for corporate income taxation, which has the lowest

Graph A18.1: **Tax wedge indicators**



(1) The second earner average tax wedge measures how much extra personal income tax plus employee and employer social security contributions (SSCs) the family will have to pay as a result of the second earner entering employment, as a proportion of the second earner's gross earnings plus the employer SSCs due on the second earner's income. For a more detailed discussion, see OECD (2016), *Taxing Wages 2016*, OECD Publishing, Paris. http://dx.doi.org/10.1787/tax_wages-2016-en.
(*) EU-27 simple average as there is no aggregated EU-27 value.
Source: European Commission

Table A18.1:**Taxation indicators**

		Germany					EU-27				
		2010	2018	2019	2020	2021	2010	2018	2019	2020	2021
Tax structure	Total taxes (including compulsory actual social contributions) (% of GDP)	37.3	39.9	40.1	40.0		37.9	40.1	39.9	40.1	
	Labour taxes (as % of GDP)	21.0	22.6	23.1	23.9		20.0	20.7	20.7	21.5	
	Consumption taxes (as % of GDP)	10.7	10.1	10.2	9.7		10.8	11.1	11.1	10.8	
	Capital taxes (as % of GDP)	5.6	7.1	6.8	6.5		7.1	8.2	8.1	7.9	
	Total property taxes (as % of GDP)	0.8	1.1	1.2	1.3		1.9	2.2	2.2	2.3	
	Recurrent taxes on immovable property (as % of GDP)	0.4	0.4	0.4	0.4		1.1	1.2	1.2	1.2	
	Environmental taxes as % of GDP	2.2	1.8	1.8	1.7		2.4	2.4	2.4	2.2	
Progressivity & fairness	Tax wedge at 50% of Average Wage (Single person) (*)	41.7	42.2	42.1	41.6	41.3	33.9	32.4	32.0	31.5	31.9
	Tax wedge at 100% of Average Wage (Single person) (*)	49.0	49.5	49.3	48.8	48.1	41.0	40.2	40.1	39.9	39.7
	Corporate Income Tax - Effective Average Tax rates (1) (*)		28.3	28.3	28.0			19.8	19.5	19.3	
	Difference in GINI coefficient before and after taxes and cash social transfers (pensions excluded from social transfers)	9.4	7.2	7.0			8.4	7.9	7.4	8.3	
Tax administration & compliance	Outstanding tax arrears: Total year-end tax debt (including debt considered not collectable) / total revenue (in %) (*)		1.1	1.1				31.9	31.8		
	VAT Gap (% of VTTL)		9.4	8.8				11.2	10.5		
Financial Activity Risk	Dividends, Interests and Royalties (paid and received) as a share of GDP (%)		4.3	4.3	4.0			10.7	10.5		
	FDI flows through SPEs (Special Purpose Entities), % of total FDI flows (in and out)		0.0	0.0	0.0			47.8	46.2	36.7	

(1) Forward-looking Effective Tax Rate (OECD).
(*) EU-27 simple average as there is no aggregated EU-27 value
Source: European Commission and OECD.

rate of return e-filing in the EU ([69]). The VAT gap (an indicator of the effectiveness of VAT enforcement and compliance) has been reduced by 0.6 pps. in 2019 and is at 8.8%, below the EU average of 10.5%. Furthermore, the average forward-looking effective corporate income tax rates were considerably (by more than 8 pps) above the EU average in 2020, similar to the years before ([70]).

([69]) European Commission, Directorate-General for Taxation and Customs Union, Annual Report on Taxation 2021 : review of taxation policies in the EU Member States, Publications Office, 2021, https://data.europa.eu/doi/10.2778/294944, see Section 2.1.4 'Improving tax administration of the Annual Report on Taxation 2021' for further details.

([70]) Ibid.

Table A19.1:**Key economic and financial indicators**

	2004-07	2008-12	2013-18	2019	2020	2021	forecast 2022	forecast 2023
Real GDP (y-o-y)	2.2	0.7	1.7	1.1	-4.6	2.9	1.6	2.4
Potential growth (y-o-y)	1.3	1.0	1.6	1.2	1.0	1.2	1.3	1.4
Private consumption (y-o-y)	0.6	0.9	1.4	1.6	-5.9	0.1	4.1	3.7
Public consumption (y-o-y)	0.7	2.1	2.1	3.0	3.5	3.1	0.5	0.2
Gross fixed capital formation (y-o-y)	2.9	0.7	2.2	1.8	-2.2	1.5	0.8	2.7
Exports of goods and services (y-o-y)	9.8	2.2	.	1.1	-9.3	9.9	2.4	4.2
Imports of goods and services (y-o-y)	7.8	2.3	4.3	2.9	-8.6	9.3	4.1	5.1
Contribution to GDP growth:								
Domestic demand (y-o-y)	1.0	1.0	1.6	1.8	-2.8	1.1	2.3	2.6
Inventories (y-o-y)	0.0	-0.4	0.2	-0.1	-0.9	1.0	-0.2	0.1
Net exports (y-o-y)	1.1	0.1	-0.1	-0.7	-0.8	0.8	-0.6	-0.2
Contribution to potential GDP growth:								
Total Labour (hours) (y-o-y)	0.2	0.1	0.5	0.1	0.0	0.1	0.2	0.2
Capital accumulation (y-o-y)	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.4
Total factor productivity (y-o-y)	0.8	0.6	0.7	0.7	0.7	0.7	0.8	0.8
Output gap	-0.3	-0.8	0.4	1.5	-3.9	-2.0	-1.4	-0.1
Unemployment rate	9.6	6.3	4.1	3.0	3.7	3.6	3.3	3.2
GDP deflator (y-o-y)	0.9	1.2	1.7	2.1	1.6	3.0	5.4	3.6
Harmonised index of consumer prices (HICP, y-o-y)	1.9	1.7	1.2	1.4	0.4	3.2	6.5	3.1
Nominal compensation per employee (y-o-y)	0.7	2.2	2.6	3.4	0.4	3.4	3.4	4.0
Labour productivity (real, hours worked, y-o-y)	1.3	0.5	0.9	0.4	0.4	0.9	.	.
Unit labour costs (ULC, whole economy, y-o-y)	-0.8	2.3	2.0	3.2	4.3	0.5	2.6	2.1
Real unit labour costs (y-o-y)	-1.7	1.1	0.2	1.2	2.7	-2.4	-2.6	-1.4
Real effective exchange rate (ULC, y-o-y)	-1.9	-0.2	1.5	-0.4	.	.	.	.
Real effective exchange rate (HICP, y-o-y)	-0.1	-1.6	0.6	-1.5	1.3	0.8	.	.
Net savings rate of households (net saving as percentage of net disposable income)	10.6	10.3	10.2	10.8	16.1	15.0	.	.
Private credit flow, consolidated (% of GDP)	0.2	1.2	3.4	5.8	6.0	.	.	.
Private sector debt, consolidated (% of GDP)	125.9	119.0	108.3	110.7	120.1	.	.	.
of which household debt, consolidated (% of GDP)	65.9	59.0	53.7	53.4	57.7	.	.	.
of which non-financial corporate debt, consolidated (% of GDP)	60.0	60.0	54.5	57.3	62.5	.	.	.
Gross non-performing debt (% of total debt instruments and total loans and advances) (2)	.	2.1	1.8	1.1	1.1	.	.	.
Corporations, net lending (+) or net borrowing (-) (% of GDP)	1.6	2.4	1.6	0.3	1.9	2.8	3.7	4.2
Corporations, gross operating surplus (% of GDP)	26.4	25.1	24.1	22.9	22.4	23.6	23.7	24.2
Households, net lending (+) or net borrowing (-) (% of GDP)	5.9	5.4	5.2	5.6	9.1	7.8	4.6	3.0
Deflated house price index (y-o-y)	-2.0	0.7	.	4.4	7.1	.	.	.
Residential investment (% of GDP)	5.2	5.4	6.0	6.4	7.0	7.2	.	.
Current account balance (% of GDP), balance of payments	5.5	6.1	7.8	7.6	7.1	7.4	6.4	6.8
Trade balance (% of GDP), balance of payments	5.6	5.5	6.8	5.7	5.7	5.4	.	.
Terms of trade of goods and services (y-o-y)	-0.7	-0.5	0.8	0.7	2.1	-2.3	-1.1	1.6
Capital account balance (% of GDP)	-0.1	0.0	0.0	0.0	-0.2	0.0	.	.
Net international investment position (% of GDP)	14.1	24.2	37.8	60.3	63.4	68.4	.	.
NENDI - NIIP excluding non-defaultable instruments (% of GDP) (1)	9.6	19.0	37.8	53.6	55.8	54.2	.	.
IIP liabilities excluding non-defaultable instruments (% of GDP) (1)	125.9	164.3	149.7	139.9	163.8	163.8	.	.
Export performance vs. advanced countries (% change over 5 years)	15.6	-1.1	-1.8	-2.9	1.9	.	.	.
Export market share, goods and services (y-o-y)	-0.4	-3.6	0.7	-1.9	2.7	0.0	-2.2	-0.1
Net FDI flows (% of GDP)	1.7	1.2	1.3	2.2	-0.1	2.9	.	.
General government balance (% of GDP)	-2.0	-1.7	1.0	1.5	-4.3	-3.7	-2.5	-1.0
Structural budget balance (% of GDP)	.	.	0.9	0.7	-2.4	-2.6	-1.8	-1.0
General government gross debt (% of GDP)	65.9	76.2	70.1	58.9	68.7	69.3	66.4	64.5

(1) NIIP excluding direct investment and portfolio equity shares

(2) domestic banking groups and stand-alone banks, EU and non-EU foreign-controlled subsidiaries and EU and non-EU foreign-controlled branches.

Source: Eurostat and ECB as of 2022-05-02, where available; European Commission for forecast figures (Spring forecast 2022)

This annex assesses fiscal sustainability risks for Germany over the short, medium and long term. It follows the same multi-dimensional approach as the 2021 Fiscal Sustainability Report, updated on the basis of the Commission 2022 spring forecast.

Table 1 presents the baseline debt projections. It shows the projected government debt and its breakdown into the primary balance, the snowball effect (the combined impact of interest payments and nominal GDP growth on the debt dynamics) and the stock-flow adjustment. These projections assume that no new fiscal policy measures are taken after 2023, and include the expected positive impact of investments under Next Generation EU.

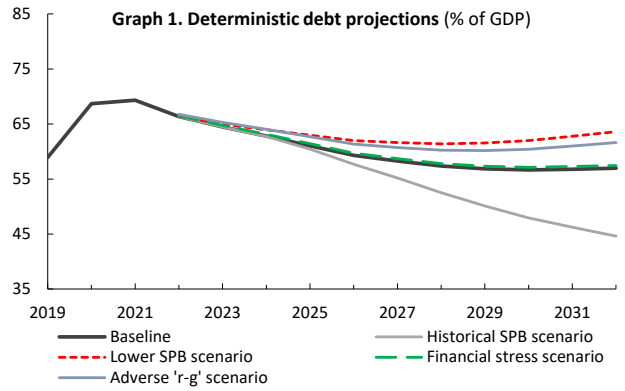
Graph 1 shows four alternative scenarios around the baseline, to illustrate the impact of changes in assumptions. The 'historical SPB' scenario assumes that the structural primary balance (SPB) gradually returns to its past average level. In the 'lower SPB' scenario, the SPB is permanently weaker than in the baseline. The 'adverse interest-growth rate' scenario assumes a less favourable snowball effect than in the baseline. In the 'financial stress' scenario, the country temporarily faces higher market interest rates in 2022.

Graph 2 shows the outcome of the stochastic projections. These projections show the impact on debt of 2 000 different shocks affecting the government's budgetary position, economic growth, interest rates and exchange rates. The cone covers 80% of all the simulated debt paths, therefore excluding tail events.

Table 2 shows the S1 and S2 fiscal sustainability indicators and their main drivers. S1 measures the consolidation effort needed to bring debt to 60% of GDP in 15 years. S2 measures the consolidation effort required to stabilise debt over an infinite horizon. The *initial budgetary position* measures the effort required to cover future interest payments, the *ageing costs* component accounts for the need to absorb the projected change in ageing-related public expenditure such as pensions, health care and long-term care, and the *debt requirement* measures the additional adjustment needed to

Table A20.1:**Debt sustainability analysis for Germany**

Table 1. Baseline debt projections	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Gross debt ratio (% of GDP)	**58.9**	**68.7**	**69.3**	**66.4**	**64.5**	**62.8**	**61.1**	**59.3**	**58.3**	**57.4**	**56.9**	**56.7**	**56.8**	**57.0**
Change in debt	-2.3	9.8	0.6	-3.0	-1.9	-1.7	-1.8	-1.8	-1.0	-0.9	-0.5	-0.2	0.1	0.2
of which														
Primary deficit	*-2.3*	*3.7*	*3.1*	*2.0*	*0.5*	*0.6*	*0.6*	*0.5*	*0.8*	*1.0*	*1.1*	*1.3*	*1.4*	*1.5*
Snowball effect	*-1.1*	*2.5*	*-3.3*	*-4.0*	*-3.3*	*-2.3*	*-2.4*	*-2.3*	*-1.8*	*-1.8*	*-1.6*	*-1.4*	*-1.3*	*-1.4*
Stock-flow adjustment	*1.0*	*3.7*	*0.8*	*-0.9*	*0.9*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Gross financing needs (% of GDP)	10.9	20.3	16.3	13.3	13.4	12.5	12.2	11.8	11.9	11.9	12.0	12.2	12.4	12.6



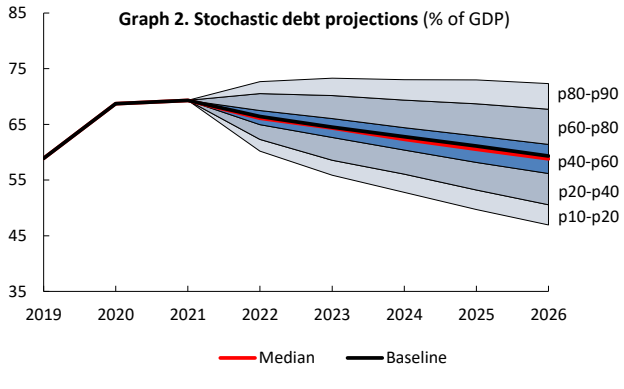


Table 2. Breakdown of the S1 and S2 sustainability gap indicators

		S1	S2
Overall index (pps. of GDP)		**-0.1**	**2.6**
of which			
Initial budgetary position		-1.4	0.5
Debt requirement		0.4	
Ageing costs		1.0	2.1
of which	*Pensions*	*0.5*	*1.0*
	Health care	*0.1*	*0.4*
	Long-term care	*0.1*	*0.2*
	Others	*0.2*	*0.5*

Source: European Commission

Table A20.2: **Heat map of fiscal sustainability risks for Germany**

Short term	Medium term										Long term	
				Debt sustainability analysis (DSA)								
					Deterministic scenarios							
Overall (S0)	Overall (S1+DSA)	S1	Overall		Baseline	Historical SPB	Lower SPB	Adverse 'r-g'	Financial stress	Stochastic projections	S2	Overall (S2+DSA)
LOW	LOW	LOW	LOW	Overall	LOW	LOW	LOW	LOW	LOW	LOW	MEDIUM	MEDIUM
				Debt level (2032), % GDP	57	45	64	62	57			
				Debt peak year	2021	2021	2021	2021	2021			
				Fiscal consolidation space	70%	40%	80%	70%	70%			
				Probability of debt ratio exceeding in 2026 its 2021 level						16%		
				Difference between 90th and 10th percentiles (pps. GDP)						25		

(1) Debt level in 2032: green: below 60% of GDP, yellow: between 60% and 90%, red: above 90%. (2) The debt peak year indicates whether debt is projected to increase overall over the next decade. Green: debt peaks early; yellow: peak towards the middle of the projection period; red: late peak. (3) Fiscal consolidation space measures the share of past fiscal positions in the country that were more stringent than the one assumed in the baseline. Green: high value, i.e. the assumed fiscal position is plausible by historical standards and leaves room for corrective measures if needed; yellow: intermediate; red: low. (4) Probability of the debt ratio exceeding in 2026 its 2021 level: green: low probability, yellow: intermediate, red: high (also reflecting the initial debt level). (5) The difference between the 90th and 10th percentiles measures uncertainty, based on the debt distribution under 2000 different shocks. Green, yellow and red cells indicate increasing uncertainty.
Source: European Commission (for further details on the Commission's multi-dimensional approach, see the 2021 Fiscal Sustainability Report).

reach the 60% of GDP debt target.

Finally, the heat map presents the overall fiscal sustainability risk classification (Table A20.2)**.** The *short-term risk category* is based on the S0 indicator, an early-detection indicator of fiscal stress in the upcoming year. The *medium-term risk category* is derived from the debt sustainability analysis (DSA) and the S1 indicator. The DSA assesses risks to sustainability based on several criteria: the projected debt level in 10 years' time, the debt trajectory ('peak year'), the plausibility of fiscal assumptions and room for tighter positions if needed ('fiscal consolidation space'), the probability of debt not stabilising in the next 5 years and the size of uncertainty. The *long-term risk category* is based on the S2 indicator and the DSA.

Overall, short-term risks to fiscal sustainability are low. The Commission's early-detection indicator (S0) does not signal major short-term fiscal risks (Table A20.2).

Medium-term risks to fiscal sustainability are low. The two elements of the Commission's medium-term analysis lead to this conclusion. First, the debt sustainability analysis (DSA) shows that government debt is projected to decline from about 66% of GDP in 2022 to around 57% of GDP in 2032 in the baseline (Table 1). This debt path is robust to possible shocks to fiscal, macroeconomic and financial variables, as illustrated by alternative scenarios and stochastic simulations, all pointing to low risks (Tables A20.1 and A20.2). Moreover, the sustainability gap indicator S1 signals that no fiscal adjustment would be needed to bring the debt ratio to 60% of GDP in 15 years' time (Table 2). Overall, the low risk reflects the current moderate public debt level, favourable macro-financial conditions, despite the budgetary pressure expected from the cost of ageing, in particular from public pensions.

Long-term risks to fiscal sustainability are medium. Over the long term, the sustainability gap indicator S2 (at 2.6 pps. of GDP) points to medium risks, driving the overall assessment. The S2 indicator suggests that, to stabilise debt over the long term, it will be necessary to address budgetary pressures stemming from population ageing, especially related to pension and health care expenditure (Table 2).

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